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SPECIAL NAVAL ISSUE

THE AEROPLANE

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No 1-13

WEDNESDAY, JANUARY 3, 1917

Edited by C. G. Grey

Vol. XII. No. 1
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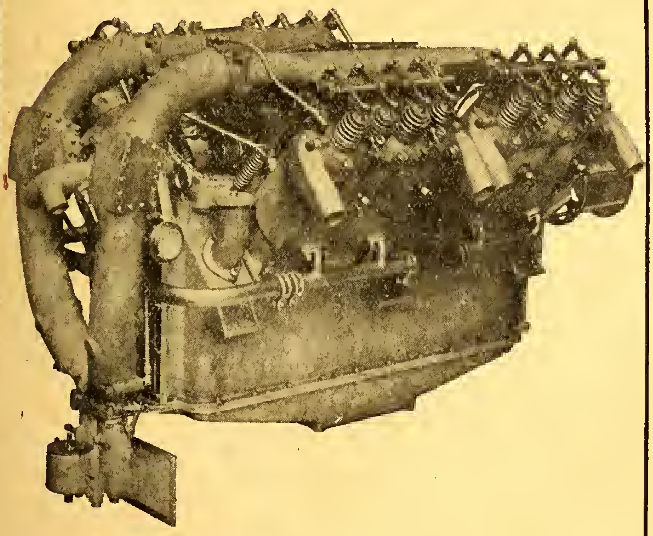

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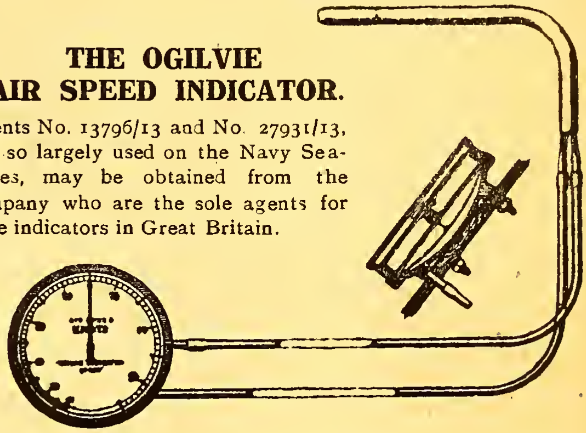

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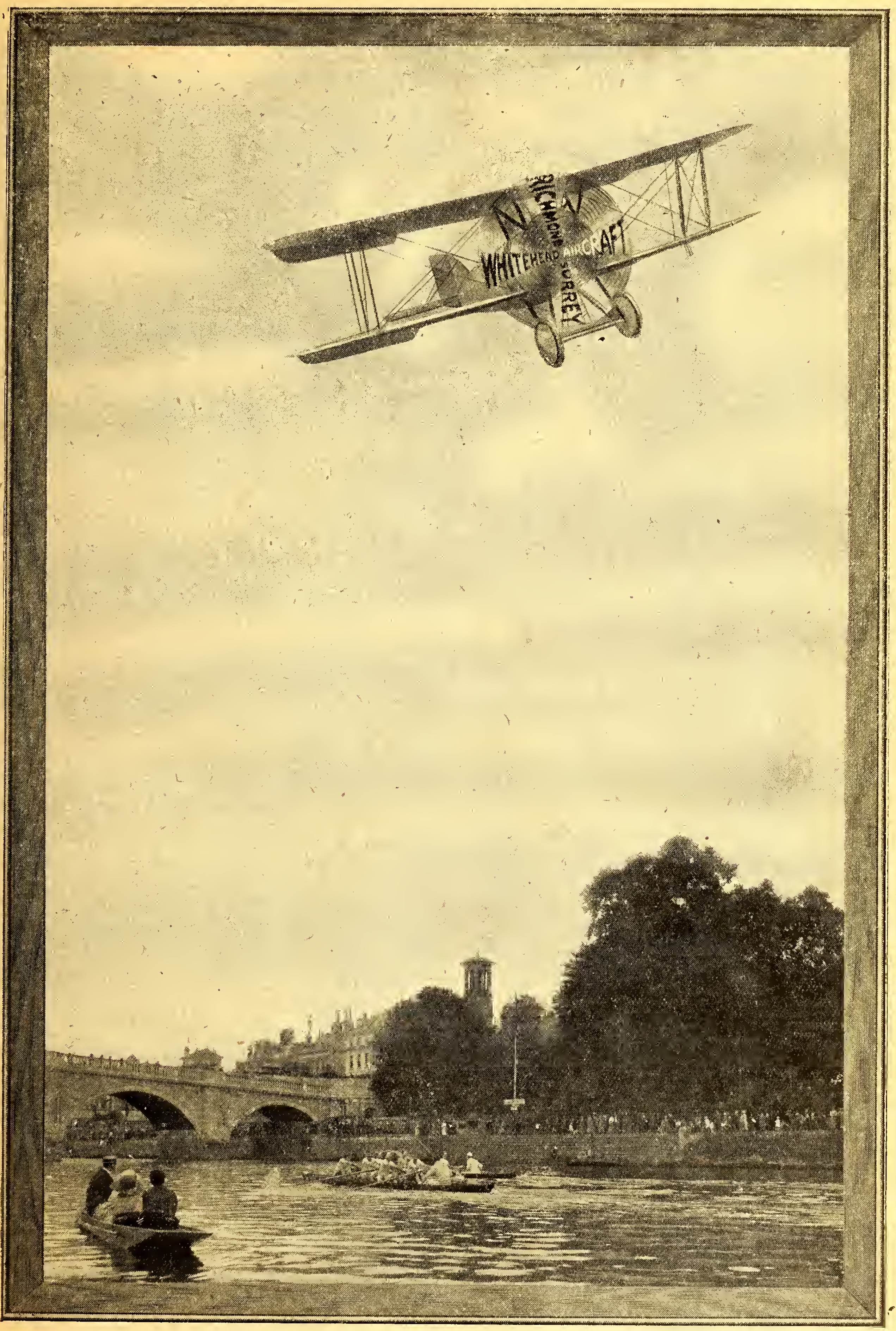
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The AEROPLANE

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ON THE AERONAUTICAL HISTORY OF 1916.

In this and the following issue of The Aeroplane the aeronautical history of the past year will be found, set forth as briefly as may be, while endeavouring not to miss any event which has helped to make history or has marked any new use for aircraft. So far as concerns the actual happenings of the year, it has been impossible to deal with the everyday work of the two Flying Services, so the reader must understand that reconnaissances, bomb raids, and air fights have been carried on day after day by all the belligerents, just as "those confounded agitators" went on day after day bombarding the late Government in the endeavour to produce for the Flying Services the equipment of machines, engines, and armament which they have needed.

There is, of course, the somewhat important difference that, whereas the aviators do every day, as a matter of course, deeds of heroism about which poets would write epics in ordinary times, the politicians have done nothing very heroic, except spoil their chances of advancement in the future by offending the heads of both political parties in the Coalition Cabinet. Nevertheless, the said agitators have helped to quite an appreciable extent our efforts to win the war, so they deserve their place in history, especially as the history of aeronautics has been so largely a history of agitations from the very beginning. That, then, is my excuse for devoting so much space each month to political history.

It seems, therefore, that the best way to deal with the Services is to record on its proper date any unusual happening or outstanding event mentioned in communiqués or dispatches, and to try to give in a separate special article some idea of what constitutes the regular work of each Service. This week one deals, naturally, with the Royal Naval Air Service, as a branch of the Senior Service, though in point of fact the R.N.A.S. only came into being officially by Royal Warrant on July 1, 1914, a month before the war began. Before that it was in theory the Naval Wing of the R.F.C., and so it is, chronologically, considerably the junior of the Flying Services.

Next week one hopes to deal equally fully with the Royal Flying Corps, as a branch of the Army. But meantime one may say that the R.F.C. is perhaps the most astonishing development, not only of the past year, but of the war, not excluding the Mechanical Transport Branch of the Army Service Corps or the much-advertised and long-delayed Land-ships or "Tanks."

All of us who are still living after having devoted our lives during the past eight years to the development and advocacy of aircraft may feel grateful to Fate for having allowed us to see at the end of 1916 the complete triumph of all our prophecies about the important part aircraft would play in war—prophecies which brought on us the ridicule, not only of the ordinary man on the ground, but of sailors, soldiers, and so-called scientists and statesmen, much less than eight years ago.

With which prelude let us to our history :—

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JANUARY.

Naval.—The first Naval event of note was a dispatch issued on January 7th from East Africa mentioning that seven British Naval aeroplanes had attacked the town of Voi.

On January 12th a dispatch from the Admiral commanding Dover Patrol commended No. 1 Wing, R.N.A.S., under Commander A. M. Longmore, R N., for their work in curtailing attacks by German aircraft on his ships when patrolling off the Belgian coast.

A curiosity of General Ian Hamilton's dispatch of January 29th was that it omitted all mention of work done by No. 2 Wing, R.N.A.S., operating with his Army in Gallipoli, though he mentioned the Royal Naval Division.

The other work of the R.N.A.S at sea and abroad, being of the usual routine nature, does not seem to have produced special mention.

Military.—The work of the R.F.C. was also of a routine nature, and apart from personal mentions in dispatches there is nothing of an outstanding nature to record.

On January 5th an article in The Aeroplane drew particular attention to the benefits to be obtained by using civilian schools officially for the production of Military pilots. It was pointed out that during 1915 the civilian schools at Hendon had passed 263 certificates, the holders of which had supplied 211 Service pilots, 6 instructors, and 1 official tester. Against this, the leading Military aerodrome at Brooklands had only passed 139 certificates, and the leading Naval aerodrome at Eastchurch only 64. It will be recorded in due course when the civilian schools were ultimately taken over by the Army, but it is of interest here to note that in November the Hendon schools under Military control had the best record for the month.

A strongly worded article on January 26th stated that aeroplanes superior to the Fokker already existed in England, but that they were being sold to France, as the official "experts" apparently did not approve of them. These machines, which had existed for some months, were ultimately adopted in quantities between three and four months later.

Foreign.—Enemy aeroplanes were recorded as having bombed Salonika on the 8th.

"Le Matin" (Paris) stated on the 10th that France had supplied during the war to her Allies one-fifth as many aeroplanes and one-third of the number of engines which she required for her own use. The same paper on the 12th drew attention to the first successes of French fighting machines fitted with guns bigger than machine-guns, and. curiously enough, the German communiqué of the 11th recorded the bringing down of a French machine fitted with a 3.8 centimetre gun (about 1½ inch).

A report from Greece on the 9th stated that Sofia had been bombed by a French aviator, but this report was never confirmed.

A German communiqué reported on the 13th that Lieuts. Bölcke and Immelmann had been awarded the "Ordre Pour le Merite" by the Kaiser.

Italy reported about the same time that an Austrian pilot carrying eight 40-lb. bombs had landed near Asiago.

A plucky act by the Swedish pilot, Dr. Thulin, was recorded about this period. Flying a Swedish seaplane he saved from destruction the British steamer "Thelma," by alighting between her and a German destroyer, which was about to attack her in Swedish territorial waters.

On the 24th it was recorded that 32 French machines had bombed Monastir and Ghevgeli, among them being some "*avions-cannons.*" This was the first big raid mentioned in the Balkans.
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About the same period it was reported that the Austrians were using machine-guns from aeroplanes at 1,800 feet in chasing Montenegrin guerrillas.

On the 26th it was reported that a crisis was in progress in French aviation, owing to the officers who did no flying drawing "Flying Pay."

On the 29th and 30th Zeppelins raided Paris in a fog, killing 26 people. M. Gustav Hervé, the well-known writer, demanded retaliatory raids on Essen, but these raids did not take place till September, and then British machines were used for the purpose. The Germans stated that these raids were a reprisal for a raid on the 28th on Freiburg-im-Breisgau.

Home Affairs.—A letter appeared in THE AEROPLANE on January 5th from Mr. Horatio Phillips, one of the pioneers of British aviation, advocating the use of multiplanes. The accuracy of his reasoning many years before has since been made manifest.

An article on January 26th pointed out that London has more to fear from aeroplanes than from airships, and that the enemy were likely to send aeroplanes to London, and airships to the North and Midlands. At that time no raids had been made in the North, though many took place afterwards, and in November one enemy aeroplane demonstrated the possibility of reaching London.

On January 12th it was announced that Mr. Pemberton-Billing, who had retired from the R.N.A.S., with the rank of Squadron-Commander, would fight the Mile End election as an Independent member, purely on the question of an adequate Air Service. His election address stated clearly that adequate aerial defence meant the lighting up of London. Defence now seems adequate, but London is still in darkness, and it seems possible that the darkness has accounted for more deaths than the Zeppelin raids on the London district. It is also interesting to note that subsequent to the last Zeppelin raid on Paris at the end of January, Paris has been very much better lighted than London.

The Mile End election was fought on January 25th, and Mr. Billing was beaten by 376 votes (1,991 to 1,615), an unexpectedly close result which shook the confidence of the Government. The agitation prior to the election had so much effect that on January 20th Mr. Asquith replied to Mr. Evelyn Cecil that reforms in our Air defences were under consideration.

A general agitation in Parliament began on January 26th, when Capt. Bennett Goldney protested against our bad defence organisation. The agitation was considerably assisted by a Zeppelin raid on January 31st, when 67 people were killed and 117 injured in the Midlands.

FEBRUARY.

Naval.—On February 16th an article in THE AEROPLANE summed up the duties and equipment of a real Naval Air Service on lines now being officially discussed, i.e., big seaplanes for getting off the water and small machines to be launched from catapults on the decks of ships. Airships were advocated for use in their proper place—out at sea.

Military.—On January 4th the death was announced of Major Penn-Gaskell, which was attributed to the bad lighting of the aerodrome at which he had attempted to land in the dark. This was practically the beginning of an agitation for proper aerodromes for night fliers, an agitation which has since borne good fruit.

On February 13th General Townshend reported the first appearance of an enemy aeroplane over Kut-el-Amara. On the 22nd General Aylmer mentioned good work by aircraft in his dispatch concerning his attack on the river Tigris.

On the 14th a report from Egypt recorded an R.F.C. reconnaissance of 400 miles from Daba, the railhead of the Mariut Railway, to El Gara. This is the first long desert reconnaissance recorded.

On the 20th it was recorded that an R.F.C. pilot from 600 feet destroyed the enemy power-station at El Hassana, 90 miles East of Suez, with a 100-lb. bomb.

On the 13th a flight was made from Milan to Nice over the mountains and sea by an R.F.C. officer on a three-engined Caproni machine, the first big flight with three engines.

It was announced on the 16th in Parliament that the Army would henceforth do all Home Defence air work.

Correspondents with G.H.Q. in France noted on the 22nd an increase in the number of enemy raids at night over towns behind the British lines, thus showing that the enemy were progressing in night flying.

Foreign.—On the night of February 1st-2nd at 2.45 a.m. a Zeppelin raided Salonika and made quite good attempts at bomb-dropping. Another attempt made on the night of February 2nd-3rd was repulsed.

A Russian communiqué dated February 2nd discovered the existence of the Fokker on the Eastern Front for the first time.

On February 4th a German note commented on the inhumanity of the skipper and crew of the trawler "King Stephen" in not rescuing the crew of the Zeppelin which was discovered adrift in the North Sea.

On February 8th M. Besnard resigned the Under-Secretaryship for Military Aviation in the French Government on account of the Army Commission of the Senate putting on him responsibility which he claimed belonged to the War Ministry. He stated that he was responsible for matériel, and not for operations. Col. Regnier was thereupon appointed Director of Military Aeronautics under the War Ministry. One of his first acts was to refuse Flying Pay to those who did not fly.

A Russian report recorded an attack by their seaplanes on February 8th on Turkish land establishments at Dunguldak on the Black Sea. The French aviator Poirée in an interview stated that the Russians were in urgent need of fast Army aeroplanes. The Sikorsky needed aeroplane destroyers to protect it. There were plenty of Russian pilots, but machines were scarce. Russian machines were only able to reach 6,000-7,000 feet. He emphasised that the German destroyers were very formidable.

On the 21st Zeppelin L.77 was brought down by a motor-gun at Revigny. In retaliation Revigny Station was smashed by another Zeppelin a night or so later.

In Italy Lt. Guido Guidi on an 80 h.p. Caudron reached 17,500 feet with a passenger in 75 minutes. Signor Antonacci on a 150 h.p. S.I.T. Voisin reached 13,200 feet with two passengers. It was also noted that the Italian Navy were using twin-engined flying boats. On the 19th the first mention occurred of three-engined Caproni bomb-droppers, used in a raid on Ljubljana, otherwise Lubiana or Laibach.

In THE AEROPLANE of the 23rd appeared the first mention of the production in November, 1915, of the first Queensland aeroplane built at Hemmant, near Brisbane, by the Queensland Volunteer Flying Civilians. Of the builders of this machine four later received R.F.C. commissions, and four became Air Mechanics.

Home Affairs.—During February Lord Northcliffe's papers energetically supported the agitation for adequate aerial forces. The "Morning Post," apparently deprecating aerial defence, stated that we "should be proud to share a spice of the danger!"

Lord Buckmaster on the 12th sneered at the idea of "perfect protection against a force that you can never perfectly protect yourself against." Events have proved his unwisdom.

On February 16th occurred the first great Air Debate, when Mr. Joynson-Hicks moved that the House regretted that no mention was made in the King's Speech of putting the Air Services on a firmer and stronger basis. He complained of lack of practice in night flying, and quoted an M.P. friend at the front as writing "How regularly these official reports seem to me to lie as to our mastery of the air." He also referred to the failure of anti-aircraft guns. Mr. H. J. Tennant, then Under Secretary for War, stated that in future the Army would do all Home Defence Air work, and he said it was not possible to have aeroplanes all over England ready for this kind of attack. Mr. Ellis Griffith referred to inexperience of active service conditions on the part of senior officers and of inadequate accommodation for landing at night. Mr. Balfour defended the Admiralty's policy, which seems to be still as it then was. Sir Henry Dalziel stated that there was grave discontent in both branches of the Services because they were not getting fair play, and he complained of wasted labour and material. Mr. Evelyn Cecil said that there was a broad feeling of want of confidence. To a great extent these criticisms still hold good.

On February 17th there was a similar Debate in the Lords. Lord Oranmore and Browne asked whether improvements were contemplated. Lord Meath complained of unpreparedness. Lord Sydenham produced his classic phrase concerning official treatment of new ideas which "go through an ascending series of officials, each knowing less than the last, till one reaches the deciding authority, who knows nothing at all. This is called the 'chain of responsibility!'" Lord Peel referred to the deplorable results of sending men up in fogs at night. Lord Mayo advocated raiding Zeppelin bases, which raids had been stopped after 1914, and he advocated a proper system of coast watchers. Lord Kitchener said that the criticism of the R.F.C. at the front was unfounded and unmerited. He said that raids on England had no influence on the Military conduct of the war. It was beyond power to guarantee these shores against Zeppelin attacks, but presaged telephonic information as to the arrival of Zeppelins, and defence by artillery were being employed, and he stated that Royal Garrison Artillery gunners from the front were being put on to anti-aircraft guns.

On February 21st Capt. Bennett Goldney attacked specifically the organisation of the R.N.A.S. at Dover. As the result of all this the so-called "Derby Committee," or Joint Committee, was promised.

On the 14th a deputation from various Midland towns which had been raided waited upon Lord French, G.O.C.-in-C., Home Forces, who told them (after 18 months of war) that efforts were being made to improve the Air Defences.

It is of some interest to note that during this period a minor agitation was going on against the use of poisonous dope in aircraft factories. Numerous aircraft workers had died from its effects. An official letter had been sent out "desiring" that dopes other than those supplied by the Royal Aircraft Factory should not be used, and this despite the fact that dopes absolutely free from poison actually existed!

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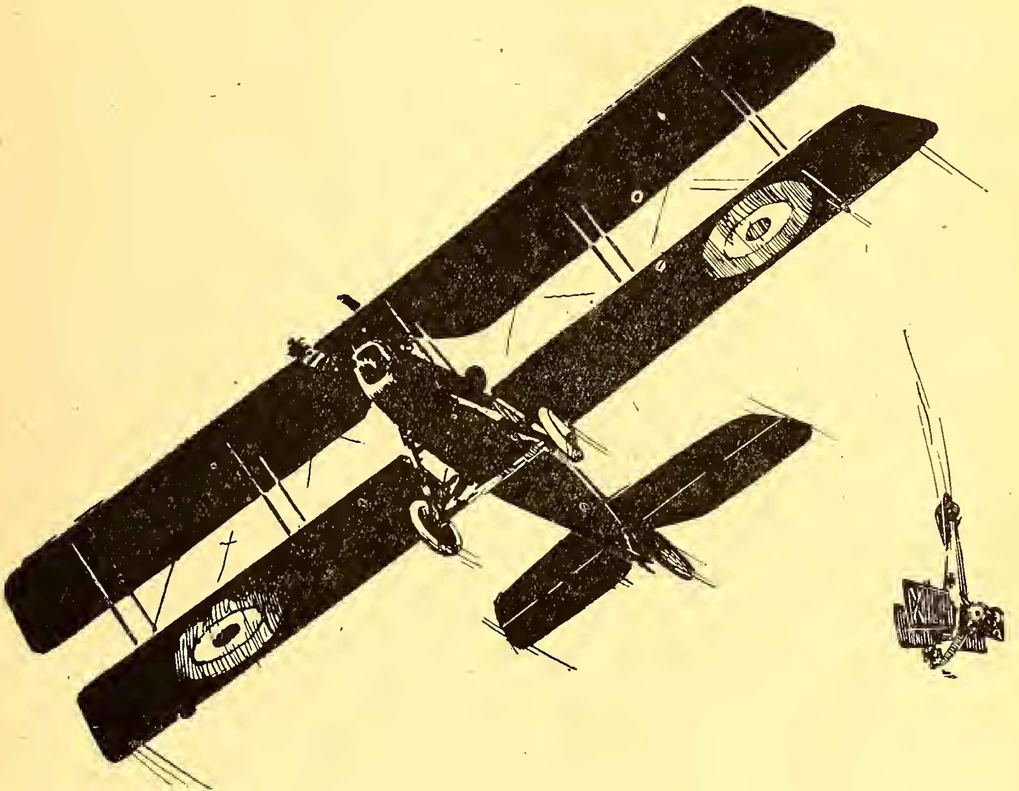

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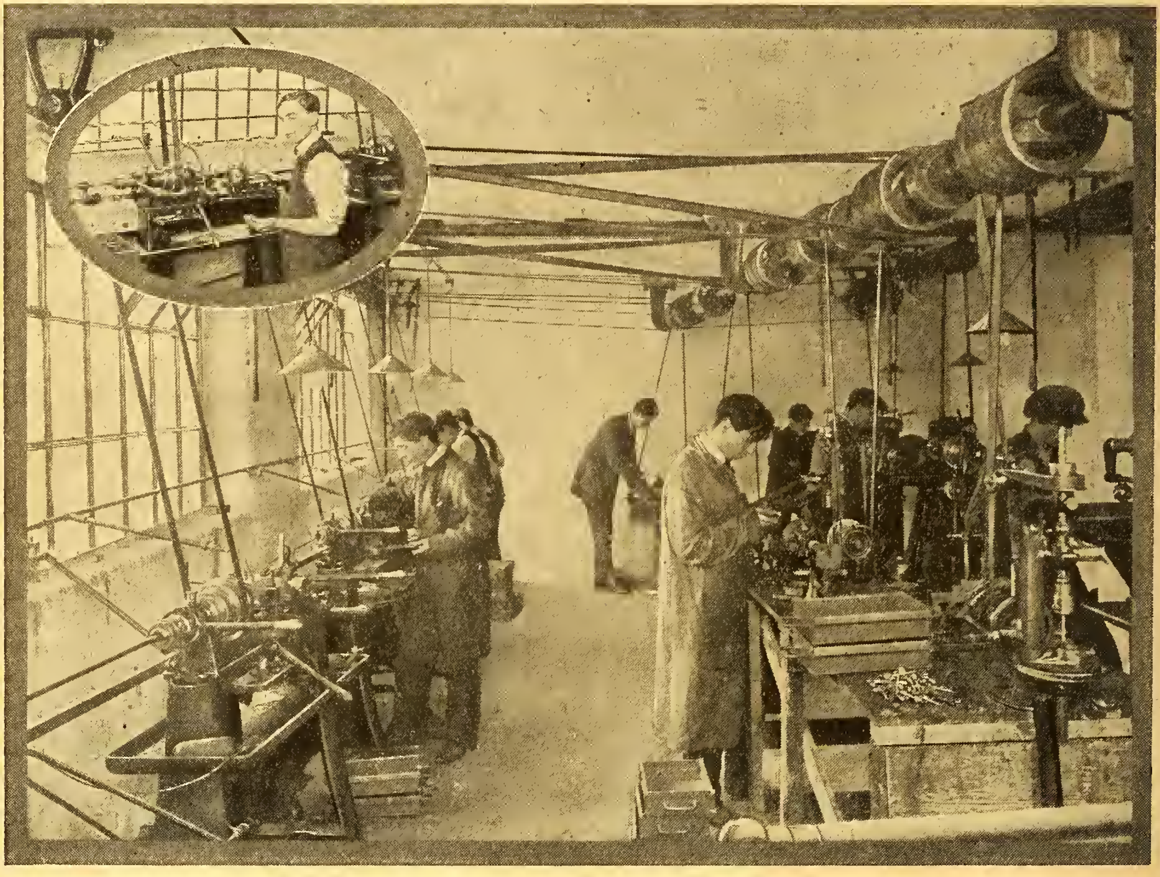

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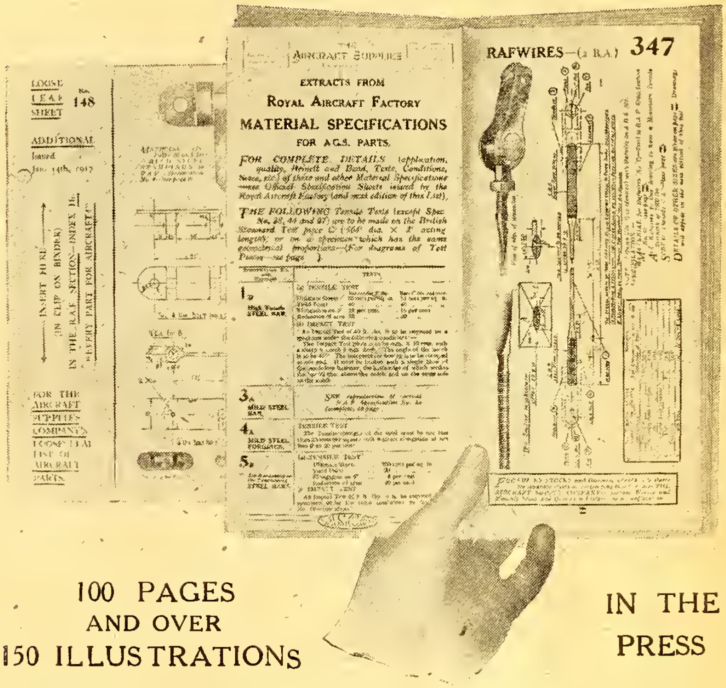

LOOSE LEAF SHEET No. 148

ADDITIONAL Issued Jan. 15th, 1917

INSERT HERE (IN CLIP ON BINDER) IN THE R.A.F. SECTION—INDEX II. "EVERY PART FOR AIRCRAFT"

FOR THE AIRCRAFT SUPPLIES COMPANY'S LOOSE LEAF LIST OF AIRCRAFT PARTS.

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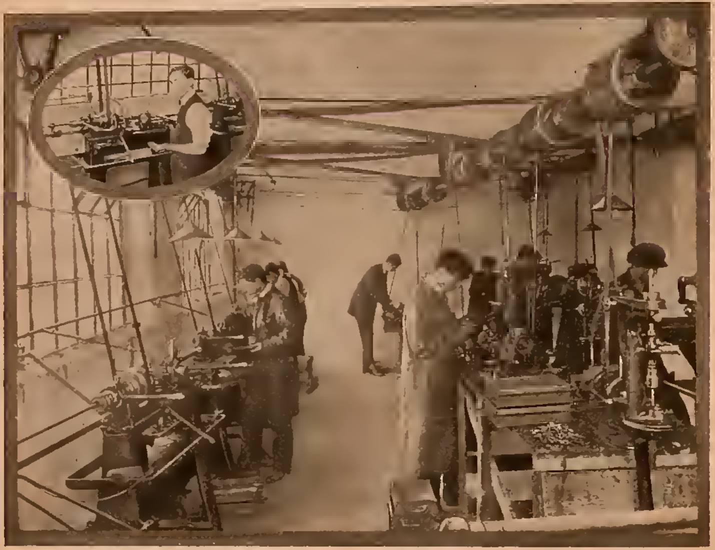

Part of one of the machine shops in the A.S.C. works, showing Capstan Lathes and Milling Machines turning out eyebolts, sockets, etc.

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IMPORTANT NOTICE.

ILLUSTRATED STOCK and QUOTATION LISTS. Within a few weeks we propose to issue, in place of our Illustrated Monthly List, a Loose Leaf Cover-Binder, which will contain, in the form of separate sheets, Illustrations and full details of Aircraft Parts, including A.G.S., Admiralty, R.A.F., Metric, ASCO, Sopwith, Short, etc. Sheets will also be issued for Materials, Instruments, Tools, etc., and will include Aviation Charts and Tables, and a mass of information of the greatest value to Aircraft Manufacturers and The Air Services.

THE present Weekly Stock Card will be replaced, during this month, by a Weekly House Journal—"AIRCRAFT SUPPLIES"—which will contain in every issue, in addition to Current Prices and particulars of Parts in Stock and expected, a short article dealing with a topic of Interest to Aircraft Constructors. We shall issue with this from time to time new Loose Leaf Sheets for insertion in the Cover-Binder referred to above. This little Journal will be a frank endeavour to interest manufacturers in the business of this Company, and to further the proposal for the Standardisation of Aircraft Parts.

THE NEXT STOCK LIST will be issued on Wednesday, January 10.

THE Aircraft Supplies Company Ltd., are CONTRACTORS to the ADMIRALTY and WAR OFFICE and to all the principal Aircraft Manufacturers.

WE ARE BUILDING UP A REPUTATION! The History of The Aircraft Supplies Company is a record of progress, initiative and organisation. We are out to help the Aircraft Industry to "increase output" during the war, and afterwards to assist in making the design and production of Aircraft a sound commercial proposition.

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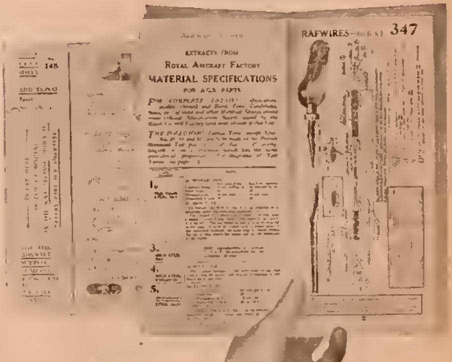

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PRESS

THE SPECIAL LIST OF STANDARD A.G.S. PARTS (R.A.F. Aeroplane General Sundries), compiled by Bernard Isaac, is now in the Press, and will be published shortly. This will contain about 100 pages, over 150 illustrations, and will include all the most important items. Each part will be ILLUSTRATED by reproductions of actual PHOTOGRAPHS and blue print DRAWINGS. SPECIFICATIONS, FITS and LIMITS, complete DIMENSIONS and R.A.F. MATERIAL specifications of all mark numbers will also be given.

EXCEPT from Aircraft Manufacturers, Commanding Officers, and Chief Stores Officers at Service Aerodromes, no more applications for copies of the A.G.S. Book can be dealt with at present, as the whole of the first edition has now been applied for and reserved. An announcement regarding a further edition will be made shortly.

OUR Policy is the STANDARDISATION OF AIRCRAFT SUPPLIES AND PARTS to ensure the "SPEEDING UP" of the production of Aircraft for War purposes.

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Bernard Isaac,
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MARCH.

Naval.—On the 20th an Admiralty communiqué stated that 50 British, French and Belgian aeroplanes, carrying an average of 200 lbs. of bombs apiece, and protected by 15 fighting machines, attacked the seaplane station at Zeebrugge, and the aerodrome at Houltade, near Zeebrugge, and all returned safely. This was the biggest raid up to date. The Admiralty omitted to state that 10 of the machines were French, so that only about 40 belonged to the R.N.A.S., and that, naturally, all these were of French make. It was pointed out in The Aeroplane at the time that it was quite possible to have 100 to 150 British-made machines in Flanders for such work. The total load carried in this raid being about 10,000 lbs. was equal to the bomb load of four Zeppelins.

On March 25th a raid was made by five seaplanes on the airship sheds in Schleswig and on the island of Sylt. The destroyer "Medusa" was damaged in a collision, three of the five aeroplanes were lost, four officers and a C.P.O. were taken prisoners, and this happened 15 months after the comparatively successful raid on Cuxhaven. All machines were apparently brought down by engine failure.

It was suggested in The Aeroplane of March 29th that a hundred aeroplanes in groups of 30 might be considered a serious attack, and 500 a really big thing, though even this would soon be considered trivial.

On the 21st Dr. Macnamara stated that three Post-Captains, R.N., had been appointed for duty with the R.N.A.S. in the past 12 months, but they were not graded in the R.N.A.S.

Military.—On March 1st the question of using civilian schools was again ventilated in this paper. On the 3rd it was announced in Parliament that Military personnel were taking over some of the London anti-aircraft guns.

On the 7th General Henderson was appointed to the Army Council.

On the 25th the R.F.C. made a raid on Bir-el-Hassanah, 100 miles East of Suez. One machine at 200 feet attacked and routed Turkish infantry, and thenceforward it became a practice for aeroplanes to attack patrols in the desert.

Incidentally, the courtesy of Turkish officers to British aviators captured in Mesopotamia was noted about this period when the Turkish C.-in-C. Nur-ed-Din sent in under flag of truce for prisoners' kits, but later returned them as the prisoners had already gone North as his guests.

It was noted on the 14th that there was definite co-operation between aeroplanes and the Duke of Westminster's Armoured Cars, R.N.V.R., in an attack on the Rebel camp at Derna in Western Egypt.

Comparative Losses.—The Allies claimed 35 Germans brought down in March, nine in the French lines, 22 behind the German lines, and four by guns.

The French admitted 13 machines brought down, one in the French lines, and 12 behind the German lines.

The Germans claimed 44 Allies' machines, 38 in battles, four by guns, and two by engine failure.

The Germans admitted 14 machines brought down, seven in battles, three by guns, and four missing.

Foreign.—On the 8th fierce air fighting was reported over and around Verdun, and on the 19th it was stated that five double-motor aeroplanes had bombed Metz. This is the first "escadrille" of double-motor machines officially mentioned.

On March 20th appeared the first report of an escape by parachute from a kite-balloon, the machine in question being adrift over Verdun.

Agitation was at this period going on in the French Press in favour of doubling the size of the French Flying Corps.

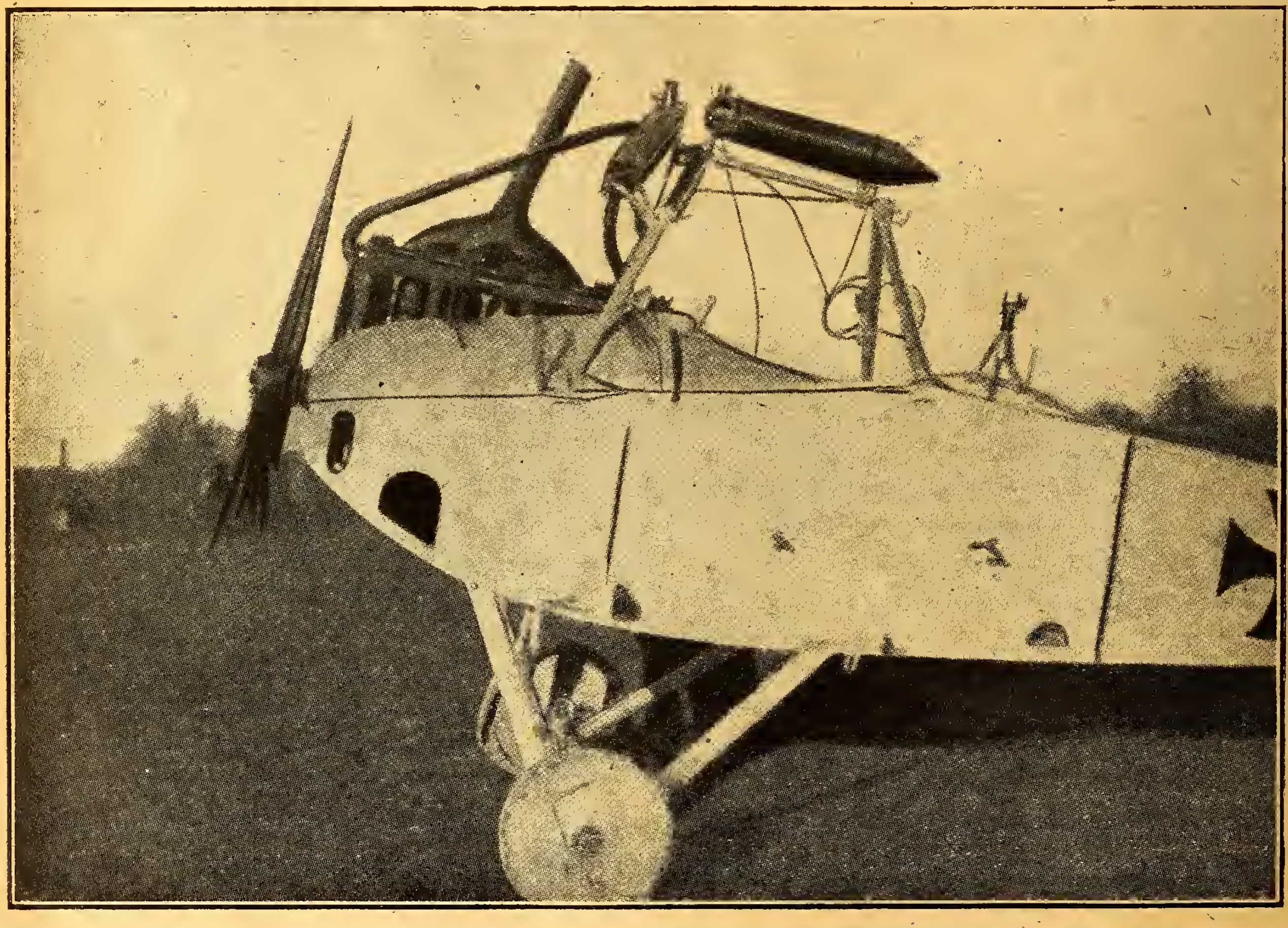
The Germans claimed early in March to have destroyed 21 French and English machines, and to have lost only six of their own during February.

On the 12th it was announced that the German Army Air Service was to be placed under separate administrative control (an *Intendantur*), the G.O.C. ranking as a Corps Commander, and controlling establishments in the Berlin Garrison as well as in the field. At this time the R.F.C. was only classed as a Division.

Reports from Germany stated that the hundredth Zeppelin had just been completed, and that the Schleswig airship sheds were protected by, among others, a 4.1-inch gun, firing a 35-lb shell to 26,000 feet at 10 rounds per minute.

In the United States the "New York Sun" of March 24th came out with a strong letter on the lack of preparation for defence, and stated that General Funston could not obtain eight extra aeroplanes which he required for the Mexican war. Also, in the United States, Lt. R. C. Saufley, U.S. Navy, raised the seaplane height record to 16,072 feet.

In Canada it was announced that the Canadian Aviation Asso



(Reproduced by courtesy of the French technical Journal "L'Aerophile," from a photograph lent by the French Aviation Militaire.)

The emplacement of the Mercédès engine, water-tank, and radiator on the L.V.G., and the trestle-shaped cabane which carries the upper wings.

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ciation, under Col. Hamilton Merritt, would conduct aviation schools in Canada.

In Australia it was stated that the New South Wales Government had completed negotiations for its own school of aviation by arrangement with Melbourne University and Technical College.

Home Affairs.—On March 7th, in the Debate on the Navy Estimates, Mr. Balfour admitted that the R.N.A.S. owed its origin to Mr. Churchill. He produced strong argument for a separate Naval Air Service, and admitted the desirability of airships and kite-balloons. He stated that Commodore Godfrey Paine, R.N., would in future take charge of the training of personnel.

On March 9th in the House of Lords, Lord Montagu made a strong attack on the Government, and advocated an Air Ministry. He also stated: "In France and Germany all the finest guns, as well as the finest aeroplanes, came out of private factories."

On March 10th Mr. Pemberton-Billing beat Capt. Brodie Henderson in the East Herts Election by 1,031 votes (4,590 to 3,559).

On March 4th he made his first speech in the Commons, complaining of the lack of raids on Zeppelin bases, despite our possessing 20 times the number of machines which we possessed when such raids were made in 1914. Mr. Billing was welcomed to the House and congratulated on his first effort in a graceful speech by Colonel Lockwood. Mr. Tennant confessed to a shortage of machines.

On the 15th Lord Derby, in the House of Lords, announced that the Joint Committee would be formed of Lord Montagu and himself, Admiral Vaughan-Lee and Commodore Sueter, representing the Admiralty, and General Henderson and Colonel Ellington, representing the War Office.

On March 21st in the Commons Mr. Joynson-Hicks complained of delay in firing at and chasing invaders. Mr. Pemberton-Billing delivered a highly constructive speech, which, however, was marred by a personal attack on General Henderson. Later in this speech, stirred by the apathy of Mr. Tennant, he delivered himself of the phrase stating that pilots had been "rather murdered than killed." Mr. Tennant denied with heat the inferiority of British machines, and cited the raid on Zeebrugge on March 19th, forgetting that nearly all the machines were French. He tried to excuse the state of affairs by talking of first one side and then the other leading in the air—as if that were a matter of necessity. Mr. Ellis Griffith stated that affairs were unsatisfactory, and that there were ten times as many street accidents because of the darkness.

On March 28th Mr. Pemberton-Billing continued his attack, and quoted instances of men needlessly lost in the Flying Services. Mr. Tennant regretted past mistakes, and defended the general system. He promised a Judicial Committtee to investigate the "murder charges."

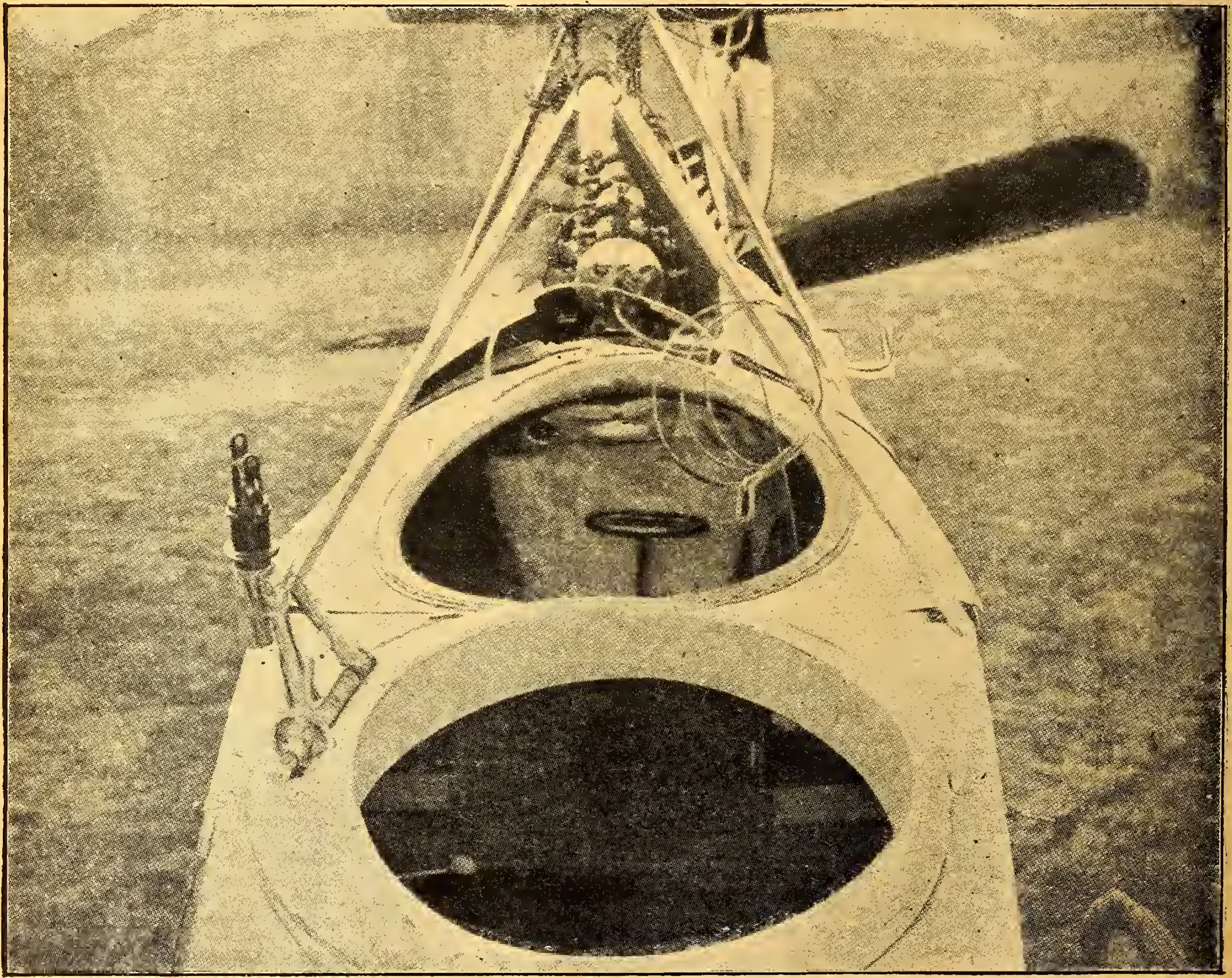
APRIL.

Naval.—On the 14th a raid was made by three Naval aeroplanes from the Eastern Mediterranean base on Constantinople, the distance of the journey being 300 miles. On the same day another machine dropped bombs at Adrianople. This raid is of interest, because all the preparations for a similar raid had been made six months earlier by the R.N.A S., but the raid was postponed for some reason not officially explained. The raid on Constantinople has not been repeated, but a raid on a point near Adrianople was made in December.

About this date it was reported that the Board of Admiralty threatened to resign if the administration of the R.N.A.S. was taken out of their hands.

On the 25th, during the operations against the German battle-cruiser squadron which shelled the East Coast, Naval land machines pursued two Zeppelins 60 miles out to sea, and land machines and seaplanes attacked the ships and submarines off Lowestoft. One pilot was wounded, and one reported missing was picked up by a Dutch boat on the 27th.

On the 27th it was announced that the Naval officers attached R.N.A.S. as observers would draw 5s. per day Flying Pay continuously, and that Warrant Officers would draw 3s. a day, and Petty Officers and men 2s. per day for days of ascent only.



(Reproduced by courtesy of "L'Aérophile," the French technical journal, from photograph lent by the French Aviation Militaire.

The rotating gun-ring and machine-gun support on an L.V.G. The Blériot type "cloche," or control wheel, is noteworthy. There are four bomb-tubes below, from which the bombs are released by Bowden wires.

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Military.—On April 1st the first Zeppelin (L15) to be brought down within British territory was sunk by Lt. Brandon, R.F.C. It descended in the Thames, and the crew surrendered. On the 5th Sir John Nixon's dispatch from Mesopotamia covering the period from April to September, 1915, mentioned good work by aircraft (Naval and Military) at Karum, at Nasiriyeh, at Kut-el-Amara, at Amara, and on the Euphrates.

On the 26th and 28th G.H.Q. communiqués noted respectively 29 and 24 air fights, and thenceforward there was a marked increase in the amount of fighting in the air.

It was reported from Cairo that on the 30th R.F.C. pilots with guns and bombs defeated hostile tribesmen at Kharga, 400 miles South of Alexandria, and 100 miles West of the Nile.

Comparative Losses.—The Allies admitted having lost in April four British machines and 20 French, and claimed that 48 German machines were destroyed, including six observed to have fallen behind the German lines.

The Germans admitted the loss of 22 machines, 14 in air fights, four missing, and four shot down by anti-aircraft guns.

Foreign.—On the 3rd a Zeppelin again bombed Dunkirk, so 31 Allied aeroplanes bombed enemy billets in return.

On the 4th it was reported that a German two-motor machine had been brought down near Verdun. It was reported that on the night of the 15th-16th a French gun-carrier attacked and damaged an enemy ship in the North Sea. It is curious that so little has been heard of gun-carriers being used for such purposes since then.

On the 21st Sous-Lieutenant Chemet on a Nieuport dropped bombs on Sofia, his total journey covering 350 miles. It was reported via Amsterdam that no damage was done.

On the 24th and 25th an airship bombed Conflans. On the 26th a French aeroplane at 13,000 feet over Zeebrugge fired 19 incendiary shells at a Zeppelin, which appeared to be hit. On the same night three French airships bombed Etang and Bensdorf, and a very big aeroplane raid was made on the lines of communication at Verdun.

The Germans reported that on the 27th three of their aeroplanes dropped bombs on the Russian warship "Slava" in the Gulf of Riga, and fires were clearly observed.

On the 29th an airship bombed Reshitza, near the Dvina, and thenceforward airship raids over Russian territory were quite common, the Russians having, apparently, no aeroplanes with which to tackle them.

An Italian communiqué of the 18th noted a concerted raid between one Italian and three French seaplanes, and sundry torpedo-boat destroyers, on Trieste, and on the 30th an Italian airship bombed Trento.

On the 25th a Turkish aeroplane dropped bombs on Allied warships at El Arish and on the docks at Port Said.

On the 19th the Turks recorded a raid by British seaplanes on the Syrian coast near Gaza, and on the 22nd on Smyrna and Cordelia.

A Turkish communiqué of the 20th said that General Townshend was expecting aeroplanes to drop flour into Kut.

American papers described the production early in April at the Curtiss Company of a 15-ton triplane with a hull 55 feet long and 10 feet beam, a span of 133 feet and four 250 h.p. Curtiss engines. American papers, at the same time, talked of the production of a machine with a span of 266 feet, with ten 200 h.p. motors, and carrying a crew of 20, 6,000 lbs. weight of bombs, and fuel for 1,000 miles. The latter machine has not been produced so far.

On April 30th the American pilot, Carlstrom, on a twin engined Curtiss, reached a height of 16,500 feet. The Curtiss pilot, McCauley, with six passengers on board, flew 88 miles in 70 minutes, and reached an altitude of 950 feet.

The Aero Club of America offered two modern aeroplanes to the United States Army for the Mexican affair, and arranged for the representatives of the Militia of 14 States to learn to fly at the Curtiss school.

From Australia it was noted that the 7th Squadron of the Australian Flying Corps was then in formation, and it was reported that on the 19th the first Australian aero-motor, built by the Tarrant Motor firm at Sydney, passed its first tests. From New Zealand it was reported that the Government were prepared to grant a free passage to England for officers recommended to the Flying Services by the New Zealand Defence Department, but that they were to be transferred to the New Zealand Expeditionary Force if unable to qualify as pilots.

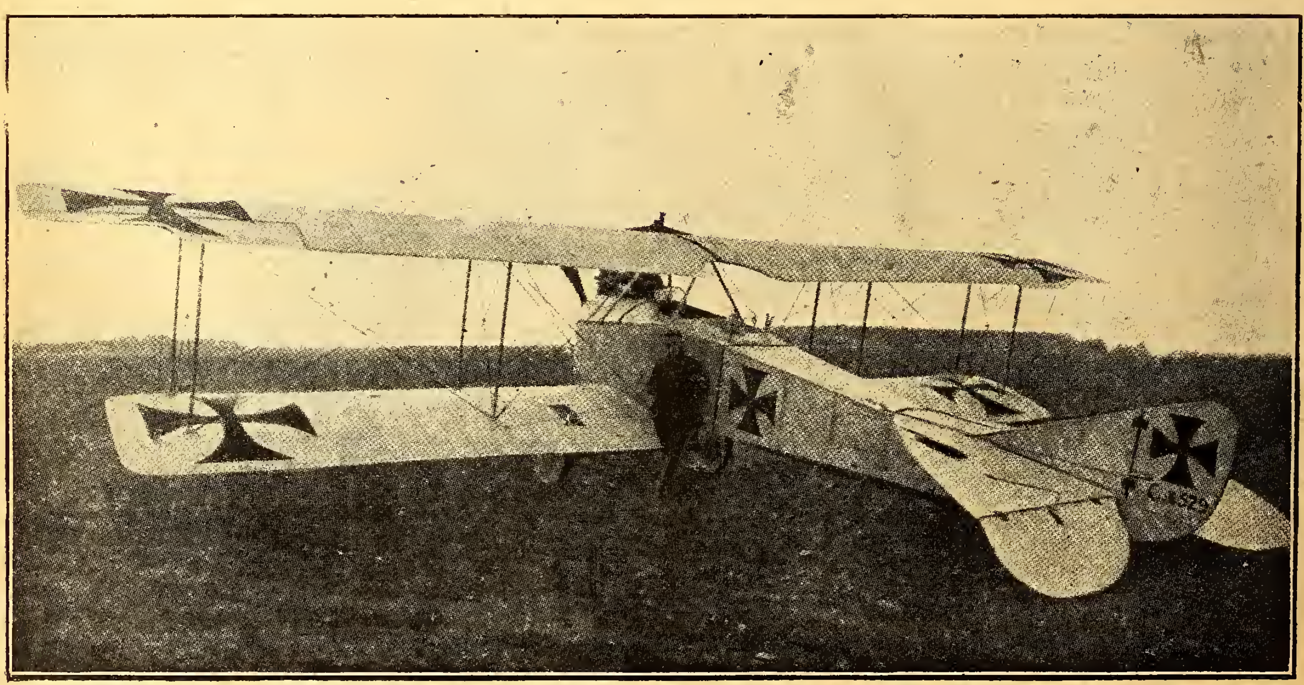
Home Affairs.—On April 12th, there was noted the formation of the Society of British Aircraft Constructors, an association of the aircraft industry which carries very considerable weight.

On the 19th the Association of British Motor and Aircraft Manufacturers was registered. This was a kind of off-shoot of the Society of Motor Manufacturers and Traders, and only includes members of the motor trade who, incidentally, make aircraft.

On the 26th Mr. Hawker, on a standard Sopwith, put the British height record up to 7,200 metres (24,400 feet).

On April 11th it was reported that Lord Montagu had resigned from the Derby Committee, and on the 17th Sir Arthur Markham asked questions in the House about the "constant friction and jealousies between the War Office and Admiralty in connection with the Air Services," and why Lords Derby and Montagu had resigned. Mr. Asquith replied, asking him to await a statement on the subject. On April 12th Mr. Billing published a complete scheme for an Imperial Air Service, and on April 19th Lord Montagu submitted his scheme for a Naval Air Service, on somewhat similar lines, to the Prime Minister.

About this time it became known that the real administration of the R.F.C. was in the hands of Brigadier-General Brancker, Brigadier-General Salmond, and Colonel Charlton, three officers who had had active service experience from the very beginning of the war, and who had displayed marked ability. From the time of their appointment remarkable and continual progress has



Reproduced by courtesy of the French technical Journal "L'Aérophile," from a photograph lent by the French Aviation Militaire.

A German L.V.G. biplane, type D.9, 1916 model, shot down by the French aviator Navarre.

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been made in the R.F.C. On the 19th Mr. Asquith stated that Lord Curzon had been conducting an inquiry into the Air Services, and recommended "large changes in organisation."

Capt. Bennett Goldney asked questions concerning dissatisfaction with the Royal Aircraft Factory, and Sir Henry Dalziel protested against the postponement of investigation into the Flying Services.

About this period a violent attack on Mr. Pemberton-Billing was made by the "Daily Chronicle"; one of his most virulent abusers being Professor Lanchester, who was well advertised by that paper as a "Member of the Government Advisory Committee on Aeronautics." Practically every point made in these attacks in the "Chronicle" was a distortion of the facts.

MAY.

Naval.—On the 2nd and 3rd May, Zeppelin L.20 was hit by guns of the British Fleet, and fell in Norway, where her remains were later blown up by the Norwegian authorities.

On the 4th Zeppelin L.47 was destroyed off the Schleswig coast by the light cruisers "Galatea" and "Phæton."

On the 5th, Zeppelin Z.85 was brought down at Salonika, supposedly by the guns of the Fleet. The prisoners stated that they came from Temesvar, in Hungary.

On the 18th, a combined attack by ships, seaplanes and land machines was made on El Arish, East of Suez, 35 miles inside the Egyptian frontier, when camps and communications were heavily bombed.

Military.—General Smuts, Commanding in East Africa, reported on the 11th the loss of an aeroplane while on reconnaissance along the Usambara railway. This is the first recorded loss of an aeroplane on Military service in East Africa, although, as a matter of fact, a seaplane and its pilot were lost in the previous year by the Fleet in the Rufigi river without the loss being officially notified.

General Haig's dispatch of the 19th commended the work of the R.F.C., and laid special stress on the development of the technical side of the Corps, such as in photographing, wireless, bombing, and in keeping machines in good condition. He also recorded the arrival of new and more powerful fighting machines.

A communiqué from Egypt recorded an attack on the 22nd and 23rd on the Sultan Ali Dinar at Darfur, when an officer of the R.F.C. dispersed a large body of cavalry, and compelled some 2,000 infantry to retire in disorder.

A note in the 'Evening Standard" of May 3rd, mentioning the work of pro-German Belgians as spies in Flanders, told of a ploughman behind the British lines who made furrows to indicate to German aeroplanes the position of batteries.

Comparative Losses.—The Allies claimed 48 German machines brought down in fighting, four by guns, and seven forced to land. Total, 59.

The Germans admitted 11 lost in fights, and five missing. Total, 16.

The Germans claimed 36 Allied machines brought down in fights, nine by guns, and two involuntary landings. Total, 47.

The Allies admitted 28 lost in fights, seven by anti-aircraft guns, and six forced to land. Total, 41.

Foreign.—A report from Toulon on the 15th stated that a French airship had been lost at sea off the coast of Sardinia, and the crew of six drowned.

On the 21st six German kite-balloons were brought down by French aeroplanes at Verdun.

On the 19th the French aviator, Poulet, with two passengers, on a "G.3" Caudron, 80 h.p. Le Rhone, reached a height of 17,200 feet (5,590 metres), and later on a "G.4" twin-Caudron reached 18,000 feet (5,860 metres) with three passengers.

The Germans reported on the 7th the capture of 15 French kite-balloons, which had broken away in a gale.

On the 20th and 21st the Germans reported aeroplane attacks on ships off the Flemish coast, and in the "concentration harbour" at Dunkirk.

A Swedish engineer, returning from Germany, reported the wreck of a Zeppelin, and the death of its crew, at Johannisthal early in the month. This was not confirmed.

The Russian correspondent of the "Times" reported on the 3rd that there were believed to be 10 Zeppelins operating over the Russian front.

On the 4th the Russians claimed to have shot down a German kite-balloon near Krivo.

The Austrians on the 3rd reported having shot down an Italian airship with a crew of four at Gorizia. An Italian report stated that a second ship returned unhurt after bombing a well-known aerodrome at Aisovizza, East of Gorizia.

In Italy, Sergt. Baldioli, on a twin Caudron, rose to a height of 5,600 metres (18,200 feet), an Italian record.

On the 27th Infante don Alonzo, the King of Spain's cousin, flew from Madrid to Carthagena in 3 hours 21 minutes, beating the Spanish distance records. The Turkish communiqué of May 1st, referring to the surrender of Kut, said: "They (the British) first threw down sacks of flour from aeroplanes, but Turkish forces put an end to this, Turkish machines shooting down one after another these old British machines." This was confirmed later in the year by a report from the G.O.C. in Mesopotamia, and it is worthy of note that between April 11th and 29th aeroplanes and seaplanes dropped 16,800 lbs. of food into Kut.

It was reported on May 3rd that the first United States Army airship had passed its initial tests in the State Armoury, New-haven, Conn. Nothing has been heard of it since. It was reported to be 175 feet long, 30 feet diameter, and to have a capacity of 150,000 cubic feet.

Home Affairs.—On May 10th the composition of the promised Judicial Committee to inquire into the Flying Corps was announced, the Chairman being Sir Clement Bailhache, Judge, and the members being Messrs. Butcher, K.C., Shortt, K.C., Balfour-Browne, K.C., Charles Bright, an engineer, Sir Charles Parsons, an engineer, and General Sir Horace Smith-Dorrien. Mr. Cotes-Preedy was the Secretary. The Committee began sitting on May 18th, and sat at intervals until July. It issued an interim report on the so-called "murder charges" in the Autumn, and its final report in December, both reports being open to considerable criticism, or rather explanation.

Mr. Pemberton-Billing protested to the Committee on May 11th against leaving out the R.N.A.S. from the Inquiry.

Yet another Air Debate took place on May 17th, when Mr. Joynson-Hicks urged "that the Government should, without delay, take every possible step to make adequate provision for a powerful Air Service." He quoted recent letters from R.F.C. pilots still complaining of the "Fokker scourge," and one from an R.F.C. Captain who had won the Military Cross, saying: "The tales about our mastery of the air are known to all of us out here to be absolutely incorrect." He also quoted another letter from the father of an R.F C. officer asking why higher-powered engines were not supplied, and saying that there were four types of German machines far better than the one which his son was flying.

Mr. Tennant could find no better reply than to object that it was "not fair to use complaints from serving soldiers!" He announced that an Air Board was to be appointed to "organise a complete system for the interchange of ideas on air problems between the two Services and such related bodies as the Naval Board of Inventions and Research, the Inventions Branch of the Ministry of Munitions, the Advisory Committee for Aeronautics, the National Physical Laboratory, and so forth." Lord Curzon was to be President, Lord Sydenham a member. Major Baird would represent the Board in the House. The Board would "charge itself with thinking out the possibility of developing its own body with a regular department in it—what is called an 'Air Ministry.'" Mr. Churchill gave a lucid explanation of his pre-war acts, and pointed out the impotence of the new Board without executive powers. Lord Hugh Cecil, an officer of the R.F.C., who had done very little, if any, flying of the more modern machines, defended the War Office, but admitted that German progress in the second stage of the war was more rapid than British progress.

On the 23rd there was another Debate in the Lords, when Lord Montagu proposed a central control for men and material of both Services, leaving executive power to the Navy and Army. Lord Derby quoted General Brackenbury as saying many years before that England was in more danger from the air than from the Spanish Armada.

Lord Montagu made his Air Service scheme public on May 26th, and during the whole of this period he had been constantly addressing public meetings in an earnest endeavour to awaken the country to a sense of the importance of aerial defence.

The first meeting of the Air Board was held on May 26th, when there were present Lord Curzon, Lord Sydenham, Admiral Tudor, Admiral Vaughan-Lee, General Henderson, General Brancker, and Major Baird. Lord Northcliffe and Lord Derby attended before the Board.

JUNE.

Naval.—A dispatch from Sir John Maxwell, G.O.C. in Egypt, recorded that the seaplane-carrier "Anne" had been torpedoed off Smyrna early in the year during an armistice. One assumes that she was torpedoed by a German submarine officer who was ignorant of the armistice with the Turks.

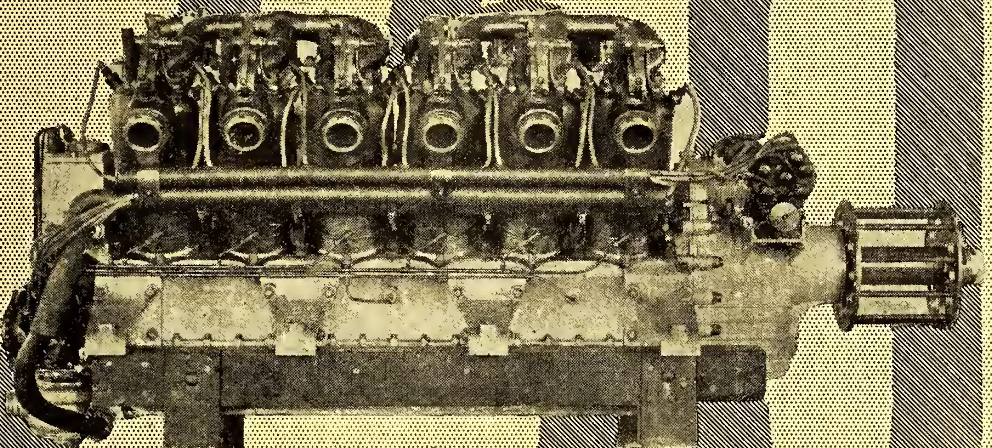
Admiral Jellicoe's dispatch of June 4th concerning the Jutland battle, and including Admiral Beatty's dispatch of June 19th, mentioned one solitary seaplane and the gallant action of the "Engadine" in towing the disabled "Warrior," this being, apparently, the total activity of the R.N.A.S. in the great battle.

Military.—On the 6th there was a special reference in the "Gazette" to Majors Holt and Higgins, who were recommended to the Army Council for distinguished service in connection with the defence of London against hostile air raids.

On the 15th there appeared in General Haig's dispatch a long list of R.F.C. officers specially recommended. On the 18th a G.H.Q. communiqué remarked on the renewed activity of enemy aircraft. On the 21st the "Gazette" contained reports from Sir John Maxwell, G.O.C. in Egypt, on the work done by the R.F.C. during 1915, and up to March, 1916.

On the 20th it was recorded that Lt. Immelmann, the famous German aviator, had been shot down by an N.C.O. gunner of the R.F.C.

LATEST
250



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C.D.C.

On the 27th Lord Montagu disclosed in the House of Lords the humorous landing of a brand-new F.E.2d. with a 250 h.p. Rolls-Royce engine of the latest type in the German lines, the pilot being ignorant of the geography of Flanders, and the passenger being a Staff Officer not belonging to the R.F.C.

On the 30th a dispatch from General Smuts, dated May 8th, when published, mentioned a number of R.F.C. officers, mainly South Africans.

Reports of the 15th, 16th, and 17th recorded British aeroplanes, presumably Naval, bombing Porto Lagos and Xanthi, Bulgarian Ports.

Comparative Losses.—The Allies claimed 34 German machines brought down in air fights, and three shot down by anti-aircraft guns. Total, 37.

The Germans admitted two lost in air fights, one shot down, and four missing. Total, 7.

The Germans claimed 23 Allied machines brought down in air fights, 10 shot down from the ground, three involuntary landings, and one caught landing a spy. Total, 37.

The Allies admitted 28 machines lost in air fights, and 12 shot down. Total, 40.

Foreign.—French reports of the 15th, 16th, and 17th recorded bomb raids on Monastir, Kuprulu, Petrich, and Doiran, intimating considerable aerial activity in the Balkans.

On the 22nd nine French machines raided Karlsruhe, 110 miles from Nancy. Four machines were lost, and the Germans reported that two of the prisoners were English. It is probable, however, that they belonged to the Escadrille Americane.

The French on the 28th announced that the Karlsruhe raid was a reprisal for the raids on the open towns of Bar-le-Duc, Luneville, Amiens, and over 60 raids on open towns between February 3rd and May 19th.

German official reports of the 4th concerning the Jutland battle said that airships and aeroplanes materially contributed to the success of the Naval forces. It is, at any rate, known that the airships did very valuable scouting work, and enabled the German Fleet to escape being cut off by the British Fleet. Also, that they enabled the crews of two damaged ships to avoid capture by escaping in destroyers and blowing up their ships.

Reports from the Balkans on the 11th stated that the Bulgarians complained of the German Air Service leaving them unprotected from French bombs, but an official Bulgarian communiqué of the 10th reported that Allied ships were driven off the mouth of the Mesta by four of their aircraft.

Another Bulgarian communiqué of the 17th complained that the Allied aeroplanes were destroying their harvest with incendiary bombs.

The Belgian Colonial Minister reported on the 19th that Belgian seaplanes on Lake Tanganyika had been bombing the German port of Kigoma and German vessels on the lake.

Home Affairs.—It was made known in The Aeroplane of the 7th that the R.F.C. were willing to support civilian schools, and on the 21st it was made known that there would be a conference between the Director of Air Organisation and the proprietors of the schools.

The proper functions of a Royal Aircraft Factory were discussed at some length in The Aeroplane of the 14th.

On the 21st there was published from a Swiss source a fairly correct description of the type of Zeppelin which was brought down in England some months later.

On the 7th it was noted that Lord Montagu had asked whether the Government would publish the report of the Committee consisting of Sir Henry Donaldson, Sir Richard Burbidge, and Sir Charles Parsons which had been inquiring into the mismanagement of the R.A.F. This was the first public notification of the existence of such an inquiry.

The Air Board commenced in this month issuing bulletins describing the doings of the R.N.A.S. and R.F.C. officers at the front, the officers being indicated by initials only with the entirely praiseworthy object of avoiding the advertising of individuals to the detriment of the efficiency of the Services.

The controversy, which had long been raging on the subject of the Services insisting on the use of poisonous dope or plane varnish in aeroplane factories, was more or less settled on the 21st, when Mr. Tennant stated in the House of Commons that "Trade contractors are allowed to use any dope which proves satisfactory in these (official) tests." Thereupon occurred a marked decrease in the number of deaths from dope poisoning, and the fact that poisonous dope should have been used unnecessarily for so long merely indicates the obtuseness of the official mind, and suggests the way in which valuable lives are wasted in other departments.

The Aeroplane completed its fifth year of existence at the end of June.

(To be continued.)

General Joffre (now Marshal of France) inspecting a captured German Aeroplane.

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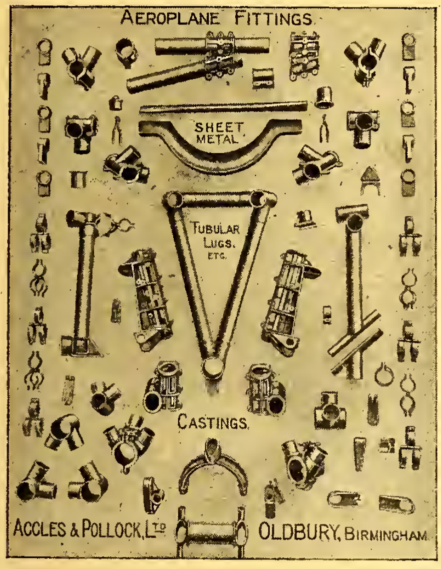

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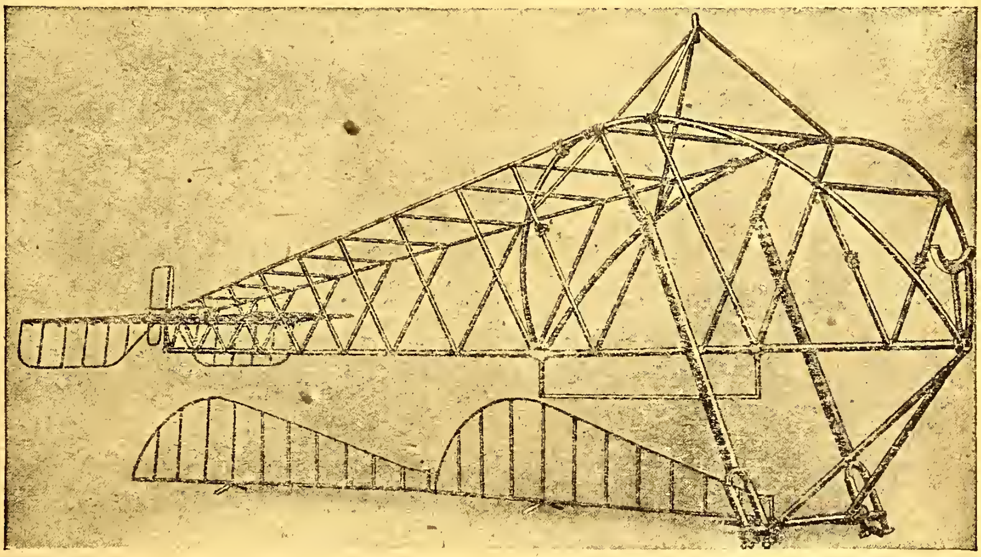

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AN APPRECIATION OF THE WORK OF THE ROYAL NAVAL AIR SERVICE.

Official Hindrances.

Through no fault of its own, the Royal Naval Air Service has come in for a good many hard words in the past year or so. The child of charity to begin with, when their Lordships of the Admiralty kindly permitted Lieuts. Samson, Gregory, and Longmore, R.N., and Lieut. Gerrard, R.M.L.I., to be taught to fly by Mr. G. B. Cockburn, who kindly gave his time for six months to the job, on Short biplanes kindly lent by Mr. Frank McClean, over an aerodrome kindly lent by the Royal Aero Club, the aeronautical branch of the Navy has always been a sort of Cinderella of the Services. When a few far-seeing officers, among them Captain Sueter, Commander Schwann, Commander Masterman, and Lieut. Boothby (as their ranks then were), began to advocate the building of airships, they met with much ridicule and little encouragement.

When later their Lordships permitted an Air Department to be formed, more or less as an "opposite number" to the Department of Military Aeronautics at the War Office, they refused to allow many excellent officers to join the Royal Flying Corps (Naval Wing), as this branch of the Service was called, and in consequence the Director of the Air Department was never able to institute and to inculcate into new-comers that spirit of Service discipline which, if it had existed at the beginning, might have made the R.N.A.S. of to-day the shining light of the Navy.

Washed Ashore.

Later still, when the war was in full swing, it was obviously impossible to spare *pukka* Naval officers for the R.N.A.S., and, though some few very able senior officers managed to join the Service, there has been only too much justification for the jibe about "dear old gentlemen who have been washed ashore from the Fleet."

Moreover, owing to many of the best officers at the Air Department going on active service early in the war, and owing to the absolute necessity for increasing the personnel of the R.N.A.S. as rapidly as possible, a number of extremely undesirable persons worked their way into the Service, not merely in subordinate positions as R.N. and R.N.A.S. officers at air stations, but as R.N.V.R. officers, attached R.N.A.S., in administrative positions at Whitehall, and in technical capacities there and in factories.

The Wrong Sort.

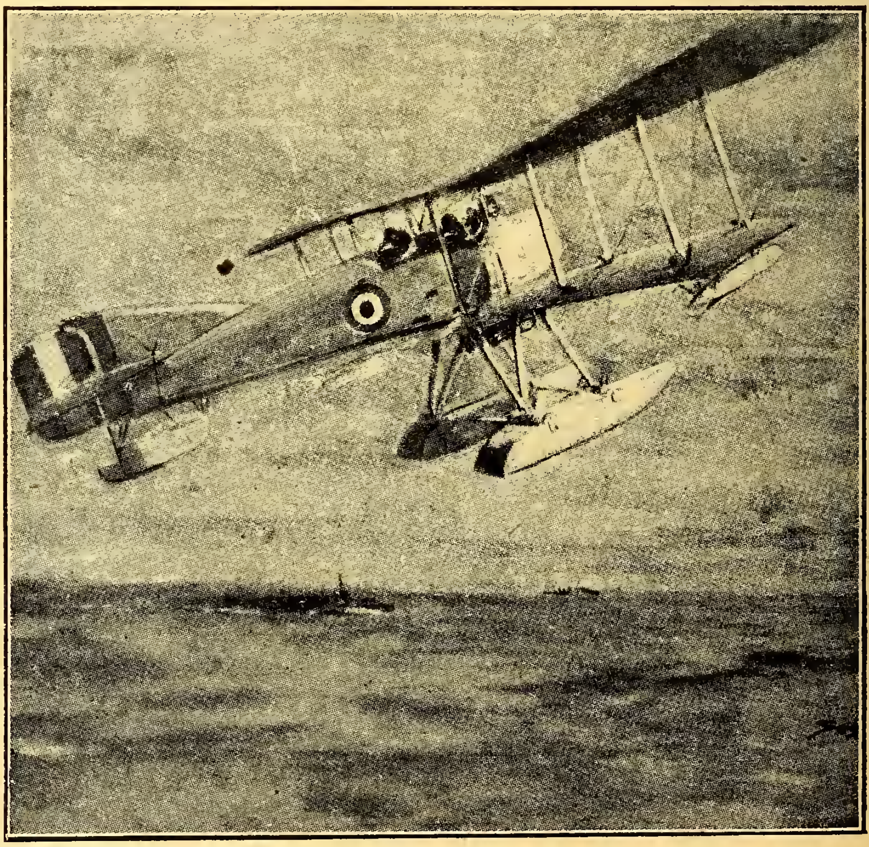
As a somewhat natural result, the originally sound nucleus of officers of the real Navy and of the Royal Regiment of Marines was simply swamped by new-comers of a singularly objectionable type, who would never have obtained commissions if the officers who selected candidates before the war had still been so employed. A craving for cheap advertisement and an atmosphere of intrigue arose. The R.N.A.S. people at home earned a very bad reputation for their behaviour in public and their lack of use in the war. Some detachments abroad were unduly prominent in the Press, as they were less reticent about their doings than were R.F.C. officers. And while all this was going on, the officers and men who were labouring silently and earnestly to help in the war were unknown.

In fact, they were unknown to such an extent that the so-called technical people, naval and civilian, at home, busy with their own intrigues, seem to have forgotten their existence and neglected their needs and their demands for aircraft and engines, and, further, seem to have forgotten that the man on active service knows what he needs very much better than does the man in a chair in Whitehall, who never goes to see the war at close quarters, and who takes excellent care hardly ever to ascend in an aeroplane even over a perfectly good aerodrome at home.

British and Colonial.

Fortunately, a number of extraordinarily gallant young men, British and Colonial, also managed to obtain commissions, and, despite their lack of proper training at first, their lack of proper machines to fly, and the lack of a proper policy of warlike operations at Whitehall, and sometimes despite lack of common intelligence on the part of their commanding officers, these youngsters have done work in the air which has been worthy of the proudest traditions of the King's Services.

Be it said, however, that since Commander Godfrey Paine left the Central Flying School to devote himself entirely to the training and discipline of Naval aviators there has been a notable improvement in the general training and deportment of the new generation of R.N.A.S. officers.



A Greeting from Isle of Grain, inscribed:—"Christmas comes but once a year,—but so does every other dam day."

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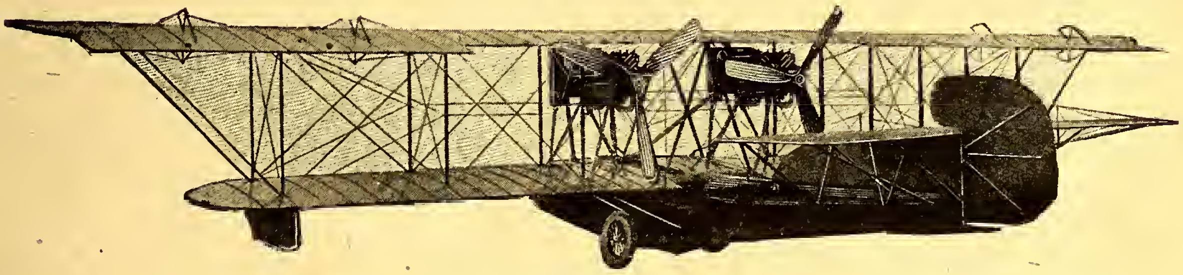

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It is to these and to the little band of able officers who have commanded some of their squadrons that I wish this appreciation to apply, for whatever good has been done by the R.N.A.S. has been done by them, despite official hindrances, and not by the schemers and slackers who have disgraced the King's uniform with their intrigues during the war—crimes far greater than cowardice in the face of the enemy—nor by the addle-pated incompetents who have thrown away good men and man-power on useless work, both in the air and in aeroplane factories.

A Wise Threat.

When their late Lordships threatened, as is alleged, to resign if inquiries were instituted into the administration of the R.N.A.S., on the lines of the inquiry being held into the R.F.C. administration, they did well in their own interests, for, if half the evils underlying the history of the R.N.A.S. throughout the war were exposed to the public, every soul responsible for those evils would be thrown out of office with ignominy, many would be cashiered, and certainly some would be prosecuted as common malefactors. The more credit, therefore, to the gallant officers and men who have done so well under such eminently adverse conditions.

Air Department Side Lines.

When the year 1916 opened, detachments of the R.N.A.S. were operating under these adverse conditions in every theatre of war, either with seaplanes or with shore-going machines, but before dealing with them it seems well to say a few words about the Air Department's "side lines." Certain officers and men had been commissioned and enlisted in the Air Department, R.N., in 1914, for the old Armoured Car Support, as R.N.V.R. A detachment of the force was, at the beginning of 1916, operating with armoured cars with the Russian troops in Asia Minor. This detachment was under Commander Locker-Lampson, and among them was Lieut.-Commander Gregory, R.N., one of the first three Naval officers to fly officially. Another detachment of the R.N.A.S.-cum-R.N.V.R. armoured cars under the Duke of Westminster did very good work during the year in Egypt. One may point out, also, that the armoured caterpillars, or land-ships, popularly known as "Tanks," were partially developed by the Air Department and then introduced to the Army, who developed them still further and used them with some success on the Somme.

Some "Tank" History.

Having been very much on the inside of the land-ship business from the start, it seems well to make a clear statement on the subject. The idea was introduced to me about October, 1914, by Mr. R. F. Macfie, one of the earliest pilots and constructors of aeroplanes in England. Mr. Macfie came back from the United States on the outbreak of war, having thrown up a good job to help his ungrateful country, and the caterpillar which he sketched for me in October, 1914, was essentially the same as that used on the Somme in August, 1916. It

The Christmas Greeting of certain employees of the Sopwith Company entitled "Work in the Erecting Shop." The imperturbability of the fabric lady amid the hurly-burly around is doubtless a subtle compliment to the seriousness of the sex about its work. The Inspector on the left is also noteworthy.

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might have been in use at Neuve Chapelle or Loos in 1915, so one is disposed to ask why there was a delay of well over a year.

During the winter of 1914-15, sundry very foolish schemes for land-ships were being discussed in the Air Department by officers and engineers evidently entirely devoid of practical experience of war conditions, and seemingly without sufficient imagination to envisage those conditions. In the hopes of serving his country more effectively, Mr. Macfie applied for and received a commission R.N.V.R., in the R.N.A.S. armoured cars, and there devoted himself to developing his land-ship designs. His original design, for which he has received no official recognition, was indisputably the forerunner of that adopted by the Air Department, for which certain people who had nothing to do with its origin, and who were only accessories after the fact, have received so much official credit and newspaper advertisement.

Another Inquiry Wanted.

It is quite time that an inquiry was instituted into the causes which delayed the production of land-ships for over a year—even though sundry reputations would suffer heavily in the process—and especially into the reason for stopping officially the manufacture of improved designs of land-ships, which appear to promise greater effectiveness than the official designs.

However, it is well to note that the credit for the "tanks" belongs primarily to Mr. Macfie, late R.N.V.R., attached R.N.A.S., for introducing the caterpillar idea and the general design of the present machine, and thereafter to Commodore Sueter and Mr. Winston Churchill for having grasped at first sight the possibilities of the new weapon—though I rather gather that it was introduced to them by someone else.

History Repeats Itself.

And here one may set down the opinion that the proper development and use of the land-going battleship, operating in conjunction with aeroplane scouts, will wash out entirely the present passing phase of trench warfare in the history of military operations, and, so far from revolutionising warfare, will bring us back, in future wars if not in this, to a proper system of mobile warfare in which strategy and tactics will play their fitting part, as in the days of Alexander, Cæsar, Belisarius, Charles Martel, Condé, Napoleon Bonaparte, and von Moltke. It may even bring us back to an earlier day before the institution of fortresses, seeing that fortresses are useless against modern guns, and that land-ships will carry guns equal to those carried by sea-going battleships.

THE REAL NAVAL AIR SERVICE.

The first duties of a Naval Air Service should obviously be at sea, so one may most fittingly deal first with the naval work of the R.N.A.S. This work is sharply divided between work with seaplanes operating from the coast and work from seaplane-carrying ships, officially known as seaplane-carriers.

As concerns the coastal work, much of high value has been done from our naval air stations. Patrols have been carried on constantly up and down the coast-line and far out to sea, searching for hostile craft above, on, and below water. The Thames Patrol, under Squadron Commander Risk (Major, Royal Marines), has been notable in the distance and duration of its operations.

Certain enemy submarines have been discovered and caught by coast patrol aeroplanes, and it is said that some submarines have been sunk by the unaided efforts of aeroplanes. One, at least, is said to have been driven into a mud-bank, where it was later caught by a patrol ship. Also, many hostile aircraft have been met and chased, or fought and sunk.

Coast Patrols.

The shore-going machines pertaining to the coast stations patrol over the sea also, though they are piously supposed to keep within gliding distance of land. The gallantry of their pilots is responsible for the fact that they frequently go far out to sea, as in the case of the officer who pursued a Zeppelin some sixty miles in the direction of Germany, and returned safely home when his ammunition was exhausted. Others have pursued hostile aircraft from the British coast and have landed in Flanders.

One may perhaps class with these stations a seaplane detachment in Flanders, as being under the Dover Patrol Command, which has done good work under considerable handicap, along the Belgian coast, both in conjunction with the local Fleet and on its own account. Squadron-Commander Hewlett, R.N., has been mentioned particularly in connection with this detachment. Being constantly at work over, and under, the fire of German coast batteries, this section has lost several promising young officers and men.

Experimental Work.

At certain of the coast stations very valuable experimental work has been done. The R.N.A.S. Repair Depôt, under Wing-Commander Gerald Aldwell, seems to have done more experimenting than repairing, and has made certain discoveries as regards the properties of wings, which, if properly developed and encouraged, may revolutionise designers' ideas as to what is and what is not a heavily loaded machine.

So far one does not learn of the information available along these lines being put to good use either by the R.F.C. or by the Trade in general, though a few firms seem to be in touch with these fresh developments. Many useful discoveries in entirely different directions have been made at the same station.

Ocean-Going Seaplanes.

At another station startling progress in the development of big seaplanes, almost of ocean-going capacity, has been made under Wing-Commander John Porte, who will be remembered as one of our finest pre-war pilots, and as the moving spirit in the preparations for an attempt to fly the Atlantic—preparations which were only stopped by the outbreak of war. In the hands of this officer the ocean-going seaplane has been brought well within sight, if indeed it does not actually exist to-day.

The patrol voyages made by his craft, and the demonstrations they have given of the seaworthiness of a properly designed and sufficiently large seaplane, should point the way for those in high places at the Admiralty towards a line of policy in the construction and use of sea-going aeroplanes which they have probably never even envisaged.

Though these two stations have not had direct influence on the course of the war so far, the work they have done must have far-reaching influences on future wars at sea, and so these stations have given the Nation excellent value for the cost of their keep.

THE SEA-GOING SECTION.

The purely sea-going section of the R.N.A.S. operating from ships at sea have carried out many arduous operations, albeit without much direct effect on Naval warfare. Captain Schwann, the first British officer to leave the water in an aeroplane, and one of those who at the Admiralty laid sound foundations for what might have been a great Naval Air Service, has been responsible for a very great amount of work in patrolling in conjunction with the Grand Fleet, and one hears rumours of developments and discoveries in the manœuvring of aeroplanes on, from, and to big ships,

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as the result of experiments carried on at sea under his directions, which should be of great value in future, if intelligently supported by those at home who do not spend their time in North Sea fogs.

One pilot, and H.M.S. "Engadine," seaplane-carrier, were mentioned in Admiral Jellicoe's dispatch on the Jutland Battle, and that is all we have been allowed to hear about R.N.A.S. craft in Fleet actions.

Apart, however, from the Grand Fleet, seaplane-carriers have been working on the southern part of the North Sea—if one should not revert to the old title, the German Ocean, after certain recent incidents in the vicinity of Dover, after the habit developed by the German Navy of capturing Dutch ships with British and Belgian passengers, and after the sinking of our patrol boats in waters which one would suppose to be commanded by the British Navy.

Mediterranean Seaplaning.

In the Eastern Mediterranean, seaplane-carriers have also done hard work. Ships under Wing-Commander L'Estrange Malone, Wing-Commander Samson, Squadron-Commander Kilner (Major, Royal Marines), operating from Egyptian, Levantine, and Ægean ports, have assisted military operations very materially. In the attacks on the Suez Canal, seaplanes have raided Turkish lines of communications and have carried out reconnaissances far inland.

Complete Self-Condemnation.

A communiqué some months ago made much of the fact that seaplanes on one of these jaunts actually crossed a mountain range 4,000 feet high in the course of their operations. This is strange evidence of the difficulties under which these detachments work, for under proper conditions it should be an everyday affair for seaplanes to reach 14,000 feet.

The mention of 4,000 feet as a noteworthy height carries with it complete proof of the ineptitude and incompetence of those whose unfulfilled duty it is to supply the Naval Air Service with engines and seaplanes suitable for their work.

One suggests to the new First Lord that he would do well to send these officers as seaplane pilots to the Eastern Mediterranean, and to send their "experts" with them as R.N.V.R. observers. Then, when they found themselves flying along the coastal mountains, frantically trying to force their soggy, slow old seaplanes up to the top, while the enemy sat on the heights and shot *down* at them, they might begin to wish that they had paid more intelligent attention to their duty, instead of buttering their own bread so richly at home.

Spoiling the Tone.

However, despite the limitations of their equipment, these seaplane pilots have continually reconnoitred the only railway and the roads from Asia Minor through Palestine to Arabia and the Sinai Peninsula, all the way from Dan to Beersheba. And, it is rumoured, they even spoilt the tone of a quiet and gentlemanly little war, which had been going on comfortably for months without losses on either side, by cutting in and dropping bombs on Turkish camps which only asked to be left unmolested in return for leaving our own people on the ground undisturbed.

In the Ægean.

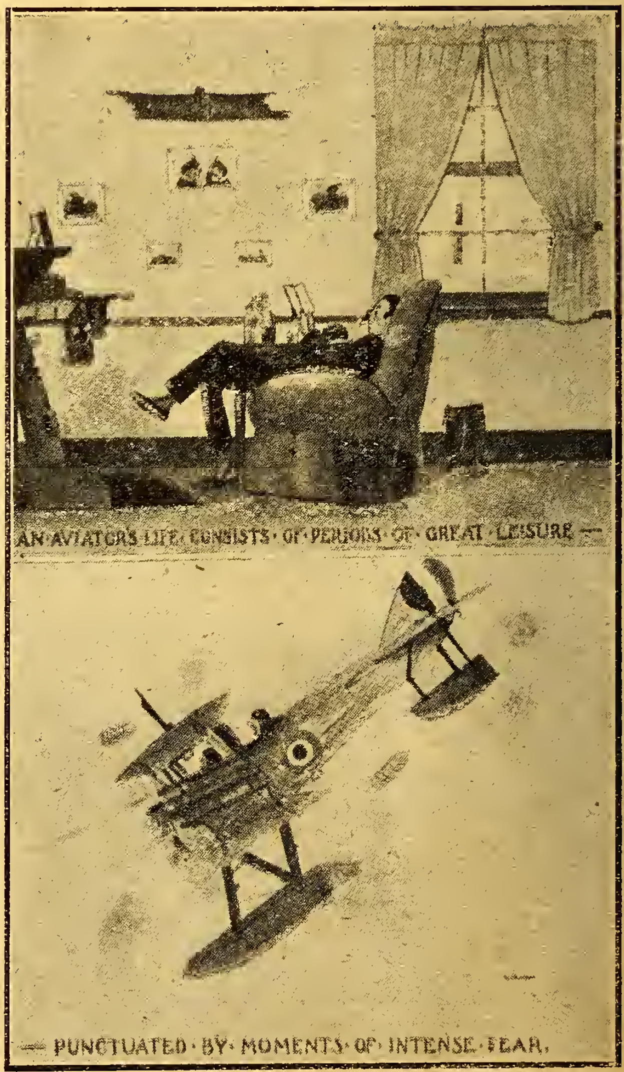
Farther north, also, seaplanes have operated throughout the year along the Bulgarian coast, annoying the Bulgar and Turkish troops on the road to the Greek front, the sea-coast roads to Seres and Demirhissar being the only routes practicable for troops and transport movements towards Doiran and Petric, till one goes far north to the Sofia-Kuprulu road which feeds the Monastir sector.

When one takes the trouble to study the map of this district, one sees how much could be done there if our people had a big force of efficient seaplanes armed with Davis guns or accurate bomb-sights, instead of the caricatures of seaplanes which have been inflicted upon them.

In this area, also, good work has been done in chasing submarines, and scouting for submarine bases, as well as in spotting for the guns of warships.

In Muddled Mesopotamia.

One of the few bright things in Mr. Asquith's "bright spot" of the war, the Mesopotamian muddle, has been the operations of a detachment of the R.N.A.S., which, after dealing faithfully with the "Königsberg" in East Africa, proceeded to assist on the Euphrates. Under Wing-Commander Gordon (Lt.-Col., R.M.L.I.), the R.N.A.S. pilots did splendid work and were frequently mentioned in dispatches, their C.O. winning a well-deserved D.S.O. The seaplanes were kept in flying order under extraordinarily difficult conditions, and despite their limitations conveyed thousands of pounds weight of stores, chiefly medical, to the besieged garrison of Kut-el-Amara, besides doing valuable reconnaissances and fighting a difficult defensive against German machines of greatly superior speed and climb. The good work of the R.N.A.S. has been ably continued under Squadron-Commander Bowhill, R.N., since Colonel Gordon was invalided.


AN AVIATOR'S LIFE CONSISTS OF PERIODS OF GREAT LEISURE —
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A Greeting from Flanders inscribed :—"Truth is stranger than fiction, but 'The Aeroplane' is stranger than either."

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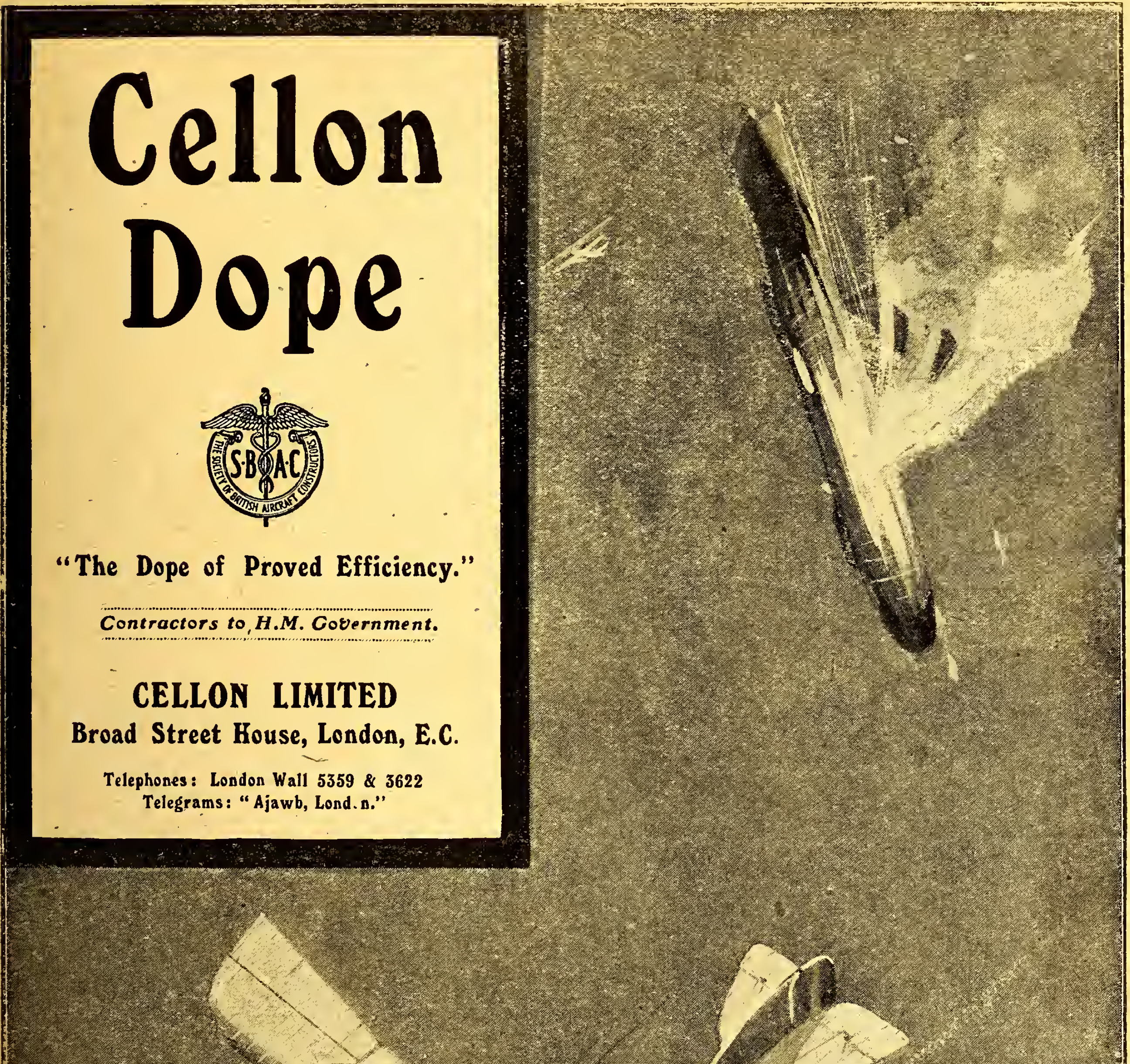

In East Africa.

Another R.N.A.S. detachment under Squadron-Commander Nanson has operated successfully in the East African campaign under General Smuts, patrolling the great lakes of Central Africa and hampering the work of the German launches and boats.

On the whole, when one considers the conditions under which the R.N.A.S. seaplanes and pilots have been compelled to work, with defective engines, and inefficient machines, and lacking intelligent support from those at home who had every opportunity of supplying them with precisely what they needed, and yet failed to do so, one is rather astonished at the excellence of what they have done. And if they have not had any very material effect on the progress of the war, they have, at any rate, indicated plainly to any ordinary intelligence what seaplanes could have done if their production had been in the hands of a capable staff at home.

THE LONGSHORE NAVAL AIR SERVICE.

Like their sea-going brethren, the shore-going section of the R.N.A.S. has had to contend with official hindrances which would have broken the hearts of any men less devoted to duty and less loyal to their Service.

The largest detachment of the Naval land machines has been operating in Flanders, at first under Wing-Commander Longmore, R.N., and later under Wing-Commander Chambers, R.N., but subordinate in everything to the Dover Patrol Command, which did not seem to be immensely interested in the possibilities of aircraft, or at any rate of aeroplanes.

The squadrons in Flanders are thoroughly well trained and organised, and are led by very experienced and highly efficient officers, both squadron and flight commanders. The men are keen and well disciplined, and among them are some of the best engine and aeroplane mechanics this country has produced, so that the machines are kept in excellent order, within the limitations of supplies from home.

The pilots, likewise, are the best of their kind. They are constantly exercised in aerial fighting practice and in bomb-dropping, and they have the greatest faith in the ability and judgment and trustworthiness of their immediate leaders. In fact it would be hard to find anywhere squadrons possessing greater potentialities for evil against the Hun. Yet they, also, have exercised no decisive effect on the course of the war.

The Reasons for Rude Questions.

Questions in the House have indicated a line of thought as to the reason for this. Ministers have been asked why raids on airship and aeroplane bases in Belgium have ceased: why the harbour at Zeebrugge, which sheltered the destroyers which sank our ships in the Channel, under the very nose of the Dover Patrol, has not been bombed regularly: and why submarines which sink ships in the North Sea and the Channel, and make their home at Zeebrugge, Ostend, and elsewhere along the coast, have not been systematically strafed when at rest?

The reasons are perhaps too deeply political for public discussion, but it remains a fact that No. 1 Wing R.N.A.S. is able and anxious to do all the work about which these questions have been asked, and yet somehow it has not been allowed to do it. Perhaps, assuming that official orders have not prevented these raids, one may hazard an opinion that efficiency is not assisted by the necessity, on which officialdom used to insist, for sending to Dover for written instructions before doing anything.

Perhaps.

The German aeroplane forces in Belgium were not, apparently, under any obligation to wait for written orders from Berlin before partaking in the war, and consequently they seemed to have an advantage over the R.N.A.S. in Flanders in being able to make their raids whenever the weather was suitable, whereas one may easily believe that the weather, which is notoriously changeable in the vicinity of the Straits of Dover, was not always able or willing to accommodate its condition to the exigencies of cross-Channel official correspondence, with the result that official permission to the R.N.A.S. to pursue warlike operations did not always synchronise with suitable weather, and suitable weather frequently occurred when orders to make war were not obtainable. No doubt this trifling difficulty might be overcome by placing the power to make war in Flanders at discretion in the hands of a senior officer, possibly R.N., and not necessarily an aviator, but one possessing initiative and mental activity, one not afraid to take responsibility, and having at any rate sufficient interest in aviation to get up in the early morning and see that his pilots start on their bellicose way.

Better Stage Management..

However, despite the peculiar limitations imposed by officialdom, the Flanders Wing has done conspicuously good service in air fighting, in bombing German aerodromes, and occasionally in spotting for the guns of ships, when low visibility hampered long-range shore batteries so that ships' guns had a chance of getting near enough to the coast to hit it. One assumes that the ships of the Dover Patrol frequently practised co-operation with aeroplane wireless signallers, and so ensured the valuable results of which one has read so much in the officially inspired newspapers. One is the more surprised that the Germans should have the impertinence and the tenacity to continue to use the Belgian coast as a base for submarines and destroyers.

The losses of the Flanders Wing have been heavy, and more than one good friend of my own has fallen in his country's service while serving with this force. My hope is therefore the greater that under the new Board of Admiralty things may be so altered that the efficient officers and men of the R.N.A.S. in those parts may in future expend their energies, and, if need be, their lives, under considerably better conditions, both as regards what one might call the "stage management" of the business, and the quality of machines and engines to which the fighting men have to trust their valuable lives.

A certain number of the machines and pilots of this detachment have co-operated with the British Expeditionary Force, and one is glad to find that their friendly competitors, the R.F.C., have formed a high opinion of their courage and skill as aerial fighters.

Très Fort if not Très Bel.

It is now known, thanks chiefly to German reports of British machines brought down, that a strong detachment of the R.N.A.S. has been operating on the Eastern Frontier of France, where, under the administration of a post-captain, R.N., it has been aiding the French *Aviation Militaire* in carrying out raids over German towns. Among its other activities a few of its pilots took part in the bombardment of the Mauser Factory at Oberndorf.

One learns that the pilots acquitted themselves with the gallantry which the people of this country expect of their warlike youth, but apart from that, perhaps the less said about this expedition the better.

Not that the enemy would be likely to learn much from anything one might say. But it might be worth the while of some members of Parliament thirsting for truth to ask how many officers and men, including mechanics, transport drivers, and general labourers, have been employed in this affair? How long have they been at it? Why certain wing and squadron commanders left the detachment? What definite results have been obtained in return for this expenditure of man-power? And how much more the same men might have helped the war

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either as soldiers in the fighting line, or as producers of war material in aircraft factories.

Officers and men alike may rest assured that no one doubts their willingness and ability to do valuable service when a suitable chance occurs, and one wishes them every opportunity for distinction in the New Year, under the New Regime at the Admiralty.

In the Near East.

Other shore-going machines of the R.N.A.S. operated successfully in the Balkan War Area under Wing Commander Gerrard (Lieut.-Col., Royal Marines), and did valuable service against the Turks and Bulgars, as usual under difficult conditions. As regards machines, they were perhaps a trifle better off than their brethren on seaplanes, but they had to fly over the Balkans, whereas the seaplanes only flew along them, so that the perils and discomforts were fairly even. Of late modern aeroplanes, of an excellent type which is now merely a year and a half old, have been sent out, and their performances have improved accordingly.

Across the Balkans.

Certain pilots of this detachment, with mechanics as passengers, have flown across Bulgaria to Roumania, as suggested in this paper when the necessity occurred. What happened to these machines and their crews when they arrived there has not been officially made known. One hears curious tales of Roumanian notions of aerial warfare and reconnaissance, so probably there will be stories worth telling when some of the Anglo-Roumanian pilots return.

Anyhow, the flight of some 300 miles over the Balkans is worthy of note, and the fact that all the pilots reached their destinations without mishap reflects credit on their ability as navigators, on the skill of the R.N.A.S. mechanics who tuned up the engines, and on the reliability of the British-built Clergêt engines and the Sopwith biplanes. These performances serve to demonstrate what good work the R.N.A.S. might have done if intelligently equipped and handled, for the flight of each machine is equivalent to a really striking raid into Germany, and what they did might have been done by hundreds of other R.N.A.S. officers, if they had had the chance.

AIRSHIPS.

The R.N.A.S. airships, though extravagant in manpower, thanks to the necessity for big handling parties, in default of the production of a little simple mechanism, have been quite useful in their comic ways.

The little "S.S." type ships, or Blimps, originally the result of a joke as to how to make the R.A.F.'s biplanes climb decently, have done a large amount of over-sea patrol work, not only hunting for submarines, but watching shipping of all kinds and importing useful knowledge and warnings to neutral and friendly ship-men.

The bigger "C.P." type—standing either for coast patrol or Crystal Palace, as you please—has done still better work, because of its greater radius of action, but one gathers that the aerodynamic, if not the mechanical, design leaves much to be desired, and that a lengthy voyage in control of a ship of this type calls for considerable physical fitness and muscular training.

British "Super-Zeppelins."

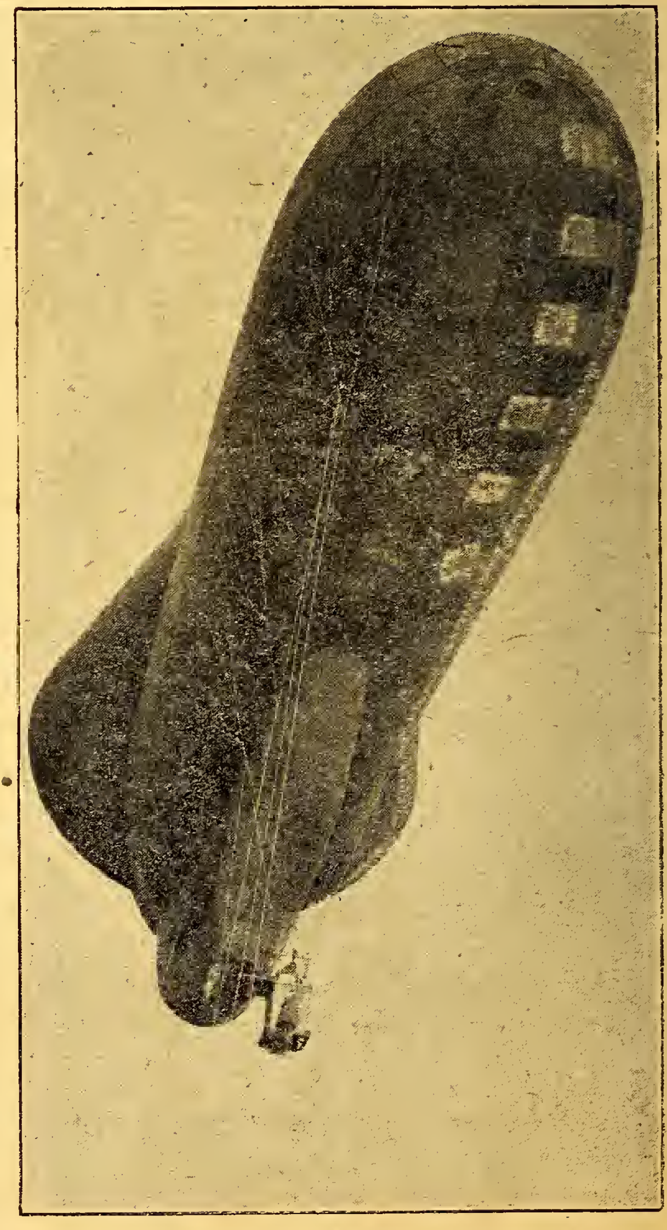
The still bigger North Sea type seems to be something of a success. It is probably more familiar to the Germans than to the British taxpayer who puts up the money for it, for doubtless all these ships have been frequently photographed, with telephoto lenses, by perfectly impartial sailormen. And it is extremely unlikely that the Germans, who have forgotten more about airships than we have begun to learn, will be deceived by the yarns about "The British Super-Zeppelins" which were published some few months ago by the late Government's tame newspapers to lull the fears of the free and independent voter. This type seems to be quite a promising experiment, and quite possibly near the limit in its own particular direction of design, though about as near the ultimate development of the ultimate airship as the modern European is near being a perfect Christian.

Of the real "hush-hush" super-Zeppelins one must say nothing. Perhaps the present reader, male or female, has seen some, perhaps not. Doubtless the Germans will see plenty of them in due course; at any rate, one hopes so. Whether they turn out a success or not, credit is due to officers like Captain Masterman and Commodore Boothby, who have had the courage of their convictions, and have stuck to their faith in the big airship.

Incidentally, one must pay a tribute to those Army officers, such as Colonel Maitland, Major Waterlow, and Major Fletcher, who brought to the Navy all their long experience of small airships, which they have transmitted so successfully to the young R.N.A.S. officers who now handle Blimps and C.P.'s with such skill.

KITE-BALLOONS.

That grotesquely humorous instrument, the Kite-balloon, which is being used with marked success by the


The New Type three-lobed Kite-Balloon, invented by Captain Cacquon, of the French Army, and largely used by the R.N.A.S.

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R.F.C., is due to the R.N.A.S. Originally a German invention, of Colonel von Parseval and Dr. Kriegsfeld, it was introduced to the Air Department by Colonel Maitland and Squadron-Commander DelaCombe as the result of watching a Parseval-Kriegsfeld "drachen" bought by the Belgians just before the war, and used very skilfully in Flanders.

With the help of the French War Department the Air Department secured a number of French-made drachens, and later had them made in quantities in this country. These two officers organised a remarkably efficient training establishment, which produced a number of well-trained Kite-balloon sections, some of which were transferred bodily to the R.F.C., some of which have done sea-work on balloon-carrying ships, and some of which have operated on land with the R.N.A.S. All have done credit to their training, and, strange to say, have had more direct influence on military operations than almost any equal number of officers and men of the Service.

The Latest Ingenuity.

The K.B. or drachen is by no means at the end of its development. The new French K.B., invented by Captain Cacquou of the French Army, has far greater stability than the old German type. A number of official photographs of this type have been published in this country and in America, and the general outlines of the type must be quite familiar to the Huns. The Cacquou K.B., with its triple-bag empennage, is capable of standing up to far greater air-speeds than is the Parseval, so can be used in something very like a full gale. Its usefulness in sea-work is therefore fairly obvious.

Bricks Without Straw.

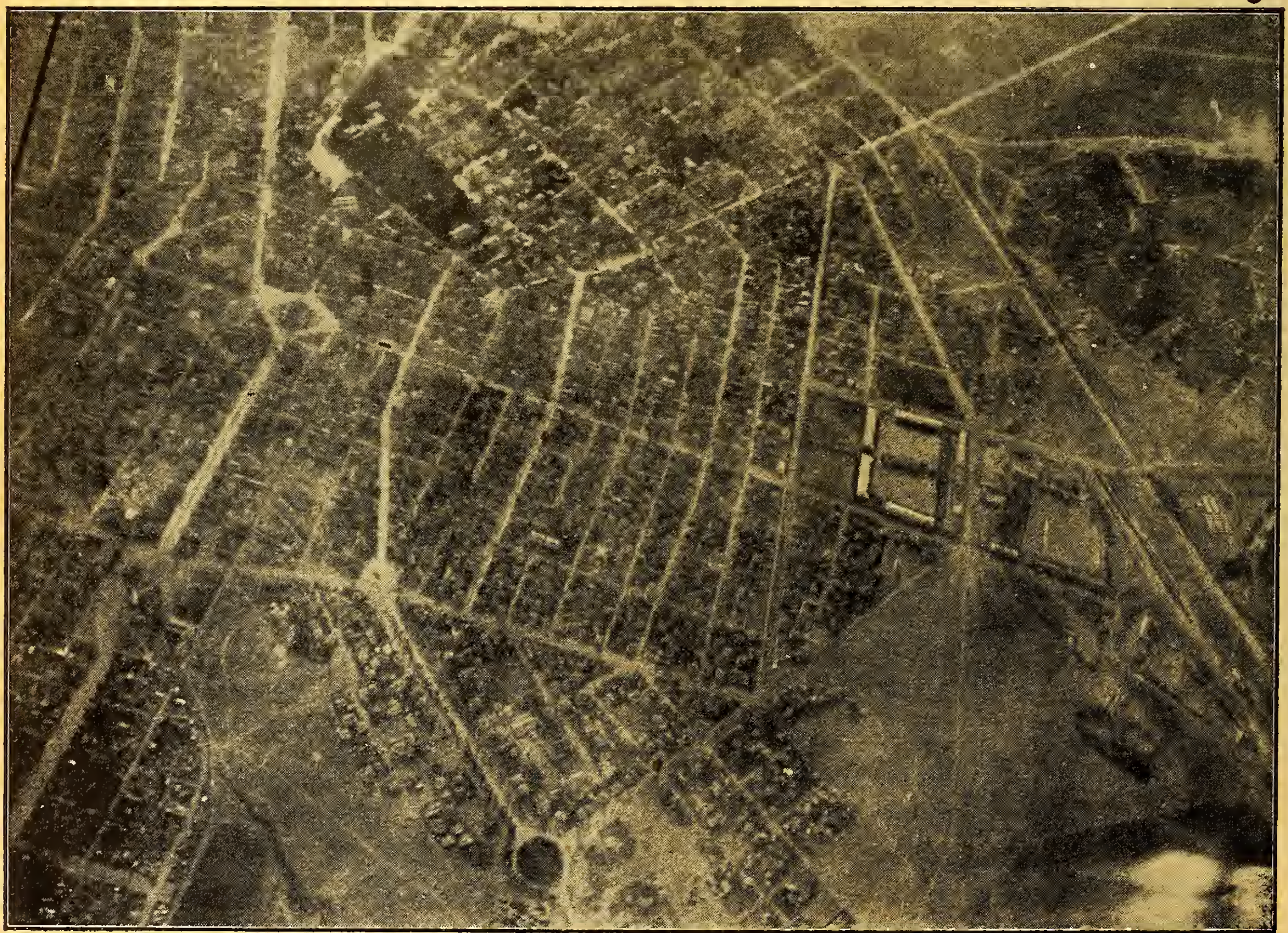
Taking it all round, the active-service officers and men of the R.N.A.S. have every reason to be proud of themselves. The Children of Israel who complained of having to make bricks without straw for the local Food Dictator had a very "cushy" job compared with the R.N.A.S. people, who have had to make war with the stuff sent them by Whitehall.

Incompetence and intrigue at headquarters has tied the hands of the faithful few at the Admiralty who have laboured to lighten the task of their friends on service. The whole Administration of the Air Department should be made the subject of a Court of Inquiry, as Squadron-Commander Pemberton-Billing insisted at the very beginning of this year. The Admiralty's refusal to grant such an inquiry when he demanded it has resulted in practically a wasted year, and in the loss of millions of pounds and sundry valuable lives.

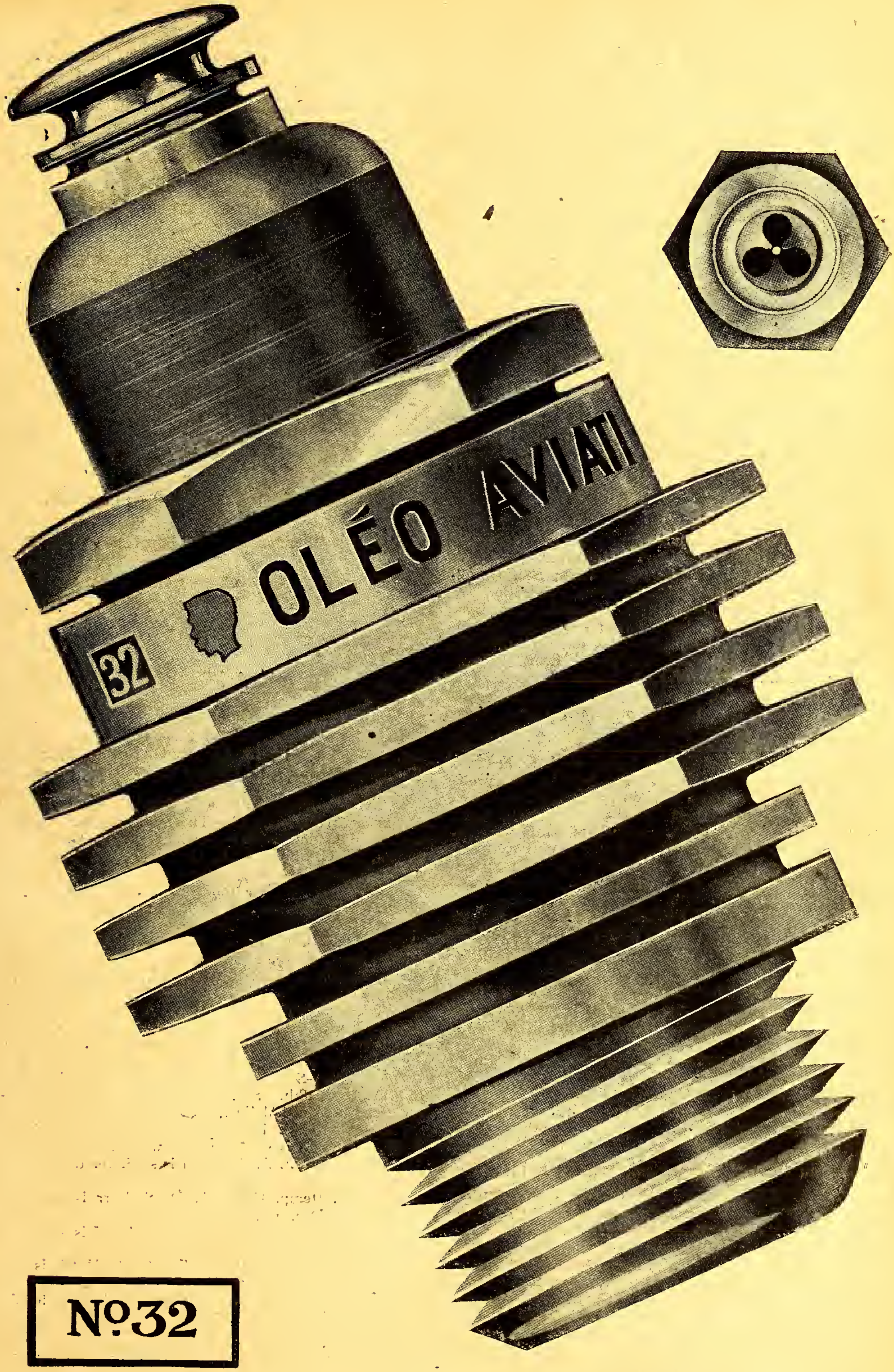
It is not too late even now to carry out sweeping reforms in the administration of the R.N.A.S. at home, and for the sake of my many friends on active service I hope such reforms may come. One gathers, from rumours of the species which does not make a habit of lying, that there are likely to be very sweeping reforms at the Admiralty in the course of the next few weeks, and possibly in the next few days. It is a pleasing habit of our governing classes, which conduces to the amenities of life, to promote an inefficient official and then shelve him. Certain promotions of the past few days may be of such a nature. And when a man at or near the top is shelved, it makes it easier to shelve or shunt the subordinates who have been responsible for departments under him. Hence one may see several interesting removals ere long.

Meantime I wish all on active service, at home and abroad, a Good New Year, and much straw for their bricks.

C. G. G.



AN ENEMY CAPITAL.—A view of Sofia, the Capital of Bulgaria, taken by a French aviator in the course of a bomb raid. The big squares on the right are the barracks, and at the top, near the left, is the beginning of the Park by the Royal Palace.



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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Dec. 22nd, 1916.

War Office, Dec. 22nd.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed:—Ses. Lt. E. G. Whelon, R. Suss. R., T.F.; Temp. Sec. Lt. F. S. Moller, M.C., Gen. List; Sec. Lt. J. C. Griffiths, Spec. Res., Sec. Lt. R. P. Harvey, M.C., 5th Lrs., Dec. 5th. Temp. Lt. E. C. Winkley, Gen. List, Dec. 14th.

Flying Officers.—Lt. R. A. P. Johns, 20th Hrs., and to be secd. (Dec. 3rd); Sec. Lt. (on prob.) P. G. Taylor, Spec. Res., Temp. Sec. Lt. G. W. Bentley, R. Fus., and to be transfd. to Gen. List; Temp. Sec. Lt. (on prob.) G. M. Underwood, Gen. List, Dec. 5th. Lt. G. R. E. Hayter, Hamps. R., T.F.; Lt. C. C. S. Montgomery, 4th Canadian Pioneer Bn.; Sec. Lt. H. T. Berry, 1st Inf. Bn., Australian Imperial Force, Dec. 6th. Temp. Sec. Lt. A. Bell-Irving, Gen. List, Dec. 7th.

Balloon Co. Comdrs.—(Graded as Sqdn. Comdrs.).—From Flt. Comdrs., and to be temp. Majs. whilst so employed:—Capt. F. M. Roxby, N. Staff. R., Spec. Res.; temp. Capt. J. O. Davis, Gen. List; Lt. (temp. Capt.) G. H. F. Faithfull, 126th Baluchistan Inf., Ind. Army; temp. Capt A. C. B. Geddes, Gen. List, Dec. 5th.

Equipment Officers, 3rd Cl.—The appointment of temp. Sec. Lt. S. Mills, Gen. List, notified in "Gazette" of Nov 20th, is antedated to Sept. 1st. Sec. Lt. (on prob.) G. F. Harmer, Spec. Res.; temp. Sec. Lt. (on prob.) W. A. Andrews, Gen. List, Nov. 2nd. Temp. Capt. A. J. Dawes, S. Wales Bord., from Adjt., and to be transferred to Gen. List, Nov. 4th. Lt. C. V. Morris, R. War. R., Spec. Res., and to be secd.; temp. Sec. Lt. (on prob.) J. E. Maclaghlin, Gen. List; temp. Sec. Lt. (on prob.) W. J. Reid, Gen. List; temp. Sec. Lt. H. Nankivell, Gen. List; temp. Sec. Lt. (on prob.) H. Newns, Gen. List; Sec. Lt. (on prob.) G. E. Quincey, Spec. Res.; Lt. R. Ross, Australian Flying Corps; temp. Sec. Lt. (on prob.) F. D. Reynolds, Gen. List; Sec. Lt. (on prob.) H. C. Sharp, Spec. Res.; temp. Sec. Lt. (on prob.) C. Rayner, Gen. List; temp. Sec. Lt. (on prob.) W. G. Ruggins, Gen. List; temp. Sec. Lt. (on prob.) E. L. Ravenscroft, Gen. List; Sec. Lt. (on prob.) J. R. Taverner, Spec. Res.; temp. Sec. Lt. C. H. Stafford, Gen. List; Sec. Lt. (on prob.) W. D. Scott, Spec. Res.; Sec. Lt. (on prob.) T. Tatton, Spec. Res.; temp. Sec. Lt. A. Smellie, Gen. List; Sec. Lt. (on prob.) L. B. Clarkson, Spec. Res.; temp. Sec. Lt. W. M. Edwards, Gen. List; temp. Sec. Lt. (on prob.) L. Cable, Gen. List; temp. Sec. Lt. (on prob.) T. B. Fraser, Gen. List; Sec. Lt. (on prob.) C. C. Cruttenden, Spec. Res.; Sec. Lt. (on prob.) J. H. Fletcher, Spec. Res.; Sec. Lt. (on prob.) H. B. D. Grazebrook, Spec. Res.; temp. Sec. Lt. A. L. Johnson, Gen. List; temp. Sec. Lt. (on prob.) T. N. Gilbert, Gen. List; Sec. Lt. (on prob.) H. Gray, Spec. Res.; Sec. Lt. (on prob.) W. A. Haslam, Spec. Res.; Sec. Lt. A. Hawley, Gen. List, Dec. 6th. Temp. Sec. Lt. (on prob.) A. H. Cabeldu, Gen. List, Dec. 13th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on prob.) A. A. McNeil resigns his commission, Dec. 23rd.

A special supplement to the "London Gazette," dated Dec. 22nd, contains a list of honours and rewards for distinguished service in the field in Mesopotamia. The following refer to the R.F.C.:—

Distinguished Service Order.—Capt. (temp. Maj.) Philip William Lilian Broke-Smith, R.E. and R.F.C.

Capt. Henry Aloysius Petre, M.C., Aust F.C.

The Military Cross.—Lt. (temp. Capt.) John Ronald McCrindle, Gord. Highrs., and R.F.C.

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From the "London Gazette" Supplement, Dec. 23rd, 1916.

War Office, Dec. 23rd.

REGULAR FORCES. — Establishments. — R.F.C.—Wing Comdr.—Capt. (temp. Maj.) G. B. Stopford, R.A., from a Sqdn. Comdr., and to be temp. Lt.-Col. whilst so empld., Dec. 12th.

Sqdn. Comdrs.—From Flt. Comdrs., and to be temp. Majs. whilst so empld.:—Capt. E. L. M. L. Gower, Spec. Res.; temp. Lt. (temp. Capt.) J. G. Swart, M.C., R.A.; Capt. A. H. Morton, R.A.; temp. Capt. T. S. Impey, Gen. List; Capt. W. Milne, M.C., N. Lan. R., and to be secd.; Lt. (temp. Capt.) J. P. C. Cooper, M.C., Spec. Res., from an Instr. in Flying, and to be temp. Maj. whilst so empld.; temp. Capt. M. H. B. Nethersole, Gen. List, from a Flt. Comdr., and to be temp. Maj. whilst so empld., Dec. 1st.

Equipment Officers, 3rd Cl.—Temp. Sec. Lt. E. F. Hall, Gen. List, Aug. 28th. Temp. Sec. Lt. (on prob.) G. W. Y. Swanson, Gen. List, Nov. 8th. Sec. Lt. (temp. Lt.) E. W. Stubbs, L'pool R., T.F., from a Flying Officer (Observer), Nov. 27th. Lt. (temp. Capt.) A. D. S. Barr, High. Divl. Engrs., R.E., T.F., Sec. Lt. H. V. Robbins, Bord. R., and to remain secd., Dec. 1st. The appt. of Sec. Lt. J. E. Wight, Spec. Res., notified in "Gazette" of May 17th, is antedated to March 20th, Sec. Lt. J. Morris, Unattd. List, T.F.; temp. Sec. Lt. (on prob.) S. Mercer, Gen. List; Sec. Lt. (on prob.) F. C. R. Johnson, Spec. Res.; Sec. Lt. (on prob.) F. H. Jefferis, Spec. Res.; Sec. Lt. (on prob.) G. K. Johnson, Spec. Res.; Sec. Lt. (on prob.) H. H. Leage, Spec. Res.; temp. Sec. Lt. (on prob.) G. A. B. Wheldon, Gen. List; temp. Sec. Lt. A. G. Tremain, Gen. List; temp. Sec. Lt. J. Wingate, Gen. List; Sec. Lt. (on prob.) R. G. Whitcombe, Spec. Res.; temp. Sec. Lt. P. G. White, Gen. List; Sec. Lt. (on prob.) J. E. Terry, Spec. Res., Dec. 6th.

Infantry.—Yorks. L.I.—Lt. (temp. Capt.) C. H. Dixon, from a Spec. Res. Bn. (attd. R.F.C.), to be Sec. Lt., Dec. 24th, and to retain his higher rank and seny. in his present unit until ordered to join a Regular unit.

Memoranda.—Qr.-Mr.-Sgt. R. H. Bright, from R.F.C., to be Sec. Lt., for duty with R.F.C., Dec. 24th.

Cdt. L. C. H. Cave to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Nov. 22nd.

For Duty with R.F.C.—Act. Sgt.-Maj. F. J. B. Powell, from R.F.C., Nov. 16th. Qrmr.-Sgt. W. Thorne, from R.F.C., Nov. 16th.

Wt. N.C.Os., and men to be temp. Sec. Lts. (on prob.):—

For Duty with R.F.C.—Pte. W. K. Crewe, from Lond. R., T.F., Nov. 16th. Pte. J. Gagne, from Can. A.S.C., Nov. 16th. 2nd Cl. Air Mech. L. C. Row, from R.F.C., Nov. 17th. Cpl. W. A. Golding, from H.A.C., T.F., Nov. 18th. Cpl. H. Fiske, from R.E., Nov. 19th. Cpl. N. Rycroft, from R.E., Nov. 21st. Cpl. W. K. Carse, from R.E.; Pte. H. L. Waddington, from A.S.C.; Pte. H. J. Q. Campbell, from Can. A.S.C., Nov. 22nd.

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From the "London Gazette" Supplement, Dec. 27th, 1916.

War Office, Dec. 27th.

REGULAR FORCES. — Establishments.—R.F.C.—Balloon Co. Comdr.—(Graded as a Sqdn. Comdr.).—Temp. Capt. A. H. Parker, M.C., Gen. List, from a Flt. Comdr., to be temp. Maj. whilst so empld., and to retain his present appt. as Comdt. of a Balloon School of Instn., Dec. 1st.

Equipment Officers, 3rd Cl.—The date of the appt. of Sec. Lt. F. Petch is June 23rd, and his rank as now described, and not as in the "Gazette" of Aug. 14th. Temp. Sec. Lt. F. R. H. Logan, Gen. List, Oct 12th

Experimental Officer, 2nd Cl.—(Graded as an Equipment Officer, 2nd Cl.).—Sec. Lt. W. R. G. Atkins, Spec. Res., from an Equipment Officer, 3rd Cl. and to be temp. Lt. whilst so empld., Nov. 25th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—The following Sec. Lts. (on prob.) are confirmed in their rank:—J. E. Terry, R. G. Whitcombe, P. G. Taylor, H. C Sharp, G. E. Quincey, L. B. Clarkson, H. Wilson, C. E. Bagram, G. K. Johnson, H. Gray, J. H. Fletcher, C. C. Cruttenden, F. C. R. Johnson, W. D. Scott, J. R. Taverner, H. B. D. Grazebrook, G. F. Harmer, T. Tatton, F. H. Jefferis, W. A. Haslam. To be Sec. Lts. (on prob.):—R. G. Jardine, C. Dolphin, A. B. Campbell, G. H. S. Dinsmore, G. V. Walsh, H. E. Jones, J. W. Fleming, I. M. Maclean, D. A. McDougall, A. Le R. Dean, Dec. 1st. C. W. Alexander, Dec. 4th. P. J. Moloney, R. D. Clerk, F. S. Coghill, E. F. Crossland, Dec. 5th. E. W. Walford, P. W. Renshaw, A. Miller, R. H. Butler, S. L. Amor, Dec. 8th. R. A. Watson, Dec. 15th.

Infantry.—Hamps. R.—Sec. Lt. G. R. E. Hayter is secd. for duty with the R.F.C., Dec. 6th.

Durh. L.I.—Sec Lt. A. E. Townsend is secd. for duty with the R.F.C., Nov. 28th. Sec. Lt. T. Armstrong is secd. for duty with a Garr. Bn., North'd Fus., Nov. 28th.

TERRITORIAL FORCE.—Yeomanry.—Sec Lt. (temp. Lt.) P. W. Battersby is secd. for duty with the R.F.C., Dec. 6th.

R.F.A.—Sec. Lt. A. Appleton is secd. for duty with the R.F.C., Nov. 15th.

R.E.—Lt. (temp. Capt.) A. D. S. Barr is secd. for duty with the R.F.C., Dec. 1st.

Infantry.—R. Berks. R.—Lt. R. Lund is secd. for duty with the R.F.C., Dec. 8th.

Lond. R.—Sec. Lt. (temp. Lt.) G. J. Hatch is secd. for duty with the R.F.C., Dec. 6th.

Durh. L.I.—Sec. Lt. A. E. Townsend is secd. for duty with the the R.F.C., Nov. 28th.

* * *

From the "London Gazette" Supplement, Dec. 28th, 1916.

War Office, Dec. 28th.

REGULAR FORCES. — Establishments.—R.F.C.—Flight Comdrs. (from Flying Officers, and to be temp. Capts. while so empld.)—Sec. Lt. (on prob.) J. I. MacKay, W. Rid. R., Spec. Res.; Sec. Lt. F. Sowrey, D.S.O., R. Fus., Dec. 1st.

Flying Officers.—Sec. Lt. A. Appleton, E. Lan. Brig., R.F.A., T.F., Nov. 15th. Temp. Lt. R. L. Stevenson, A.S.C., and to be transfd. to Gen. List, Nov. 16th. Temp. Sec. Lt. (on prob.) J. W. Cairns, Gen. List, Dec. 2nd. Temp. Sec. Lt. F. A. W. Handley, R.E., Dec. 5th. Sec. Lt. (temp. Lt.) P. W. Battersby,

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W. Som. Yeo., T.F.; Sec. Lt. (temp. Lt.) G. J. Hatch, Lond. R., T.F.; temp. Sec. Lt. (on prob.) H. S. Tighe, attd. E. Surr. R.; temp. Sec. Lt. H. A. B. Norris, Gen. List; Sec. Lt. D. N. Robertson, Spec. Res., Dec. 6th. Temp Sec. Lt. E. H. Comber-Taylor, Gen. List, Dec. 7th. Lt. R. Lund, R. Berks R., T.F.; Lt. V. H. Huston, Canadian A.S.C.; Lt. L. M. S. Essell, E. Kent R., and to be secd.; Lt. H. A. E. Matthews, Dorset R., and to be secd., Dec. 8th. Temp. Sec. Lt. W. C. Marsh, attd. R. Berks. R.; temp. Sec. Lt. L. A. Hardwick-Terry, R.E.; Sec. Lt. L. L. Carter, Spec. Res.; temp. Lt. R. E. Johnson, Som. L.I., and to be transfd. to Gen. List, Dec. 9th. Sec. Lt. G. E. Hawksley, R.F.A., Spec. Res.; Sec. Lt. (on prob.) E. H. Penberthy, Lond. R., T.F., Dec. 10th. Temp. Sec. Lt. A. J. Gogarty, Gen. List; Capt. (temp. Maj.) R. H. Howell, 15th Lrs., Ind. Army; temp. Lt. J. B. Jaques, M.C., Durh. L.I., and to be transfd. to Gen. List, Dec. 1st.

Park Comdr.—Qrmr. and Hon. Lt. (temp. Capt.) J. H Wilford, R.F.C., from an Equipment Officer, 1st Cl., Oct. 10th.

Equipment Officers, 1st Cl.—From the 2nd Cl., and to be temp. Capts. whilst so empld.:—Qrmr. and Hon. Lt. L. Newman, City of Lond. Yeo., T.F.; temp. Lt. E. J. Howard, Gen. List; Sec. Lt. (temp. Lt.) K. D. Abercromby, Spec. Res., Nov. 1st.

2nd Cl.—Lt. F. M. I. Watts, Worc. R., from the 3rd Cl., Dec. 11th. Temp. Sec. Lt. A. E. Biscoe, Gen. List, and to be temp. Lt. whilst so empld., Dec. 22nd.

Schools of Mil. Aeronautics.—Asst. Comdt. (Staff Officer, 2nd Cl.).—(Graded for pay as a Brig. Maj.).—Temp. Capt. F. A. Forde, Gen. List, from Adjt., vice temp. Maj. A. E. G. Maccallum, Gen. List, Dec. 14th.

Chief Instr.—(Graded as a Sqdn. Comdr.).—Capt. C. M. Crowe, Spec. Res., from a Flt. Comdr., from Nov. 1st to Dec. 13th.

Memoranda.—To be temp. Lts. while serving with R.F.C.:—Temp. Sec. Lt. E. A. H. Visct. Exmouth, June 1st. Temp. Sec. Lt. R. F. Power; Sec. Lt. M. A. A. Lillis, R.I.R.; temp. Sec. Lt. R. B. Wainwright, attd. 17th Lrs.; temp, Sec. Lt. G. N. Dennis, E. York. R.; Sec. Lt. A. Jennings, R.H. and R.F.A.; Sec. Lt. F. MacB. Paul, R. War. R.; temp. Sec. Lt. F. W. Deane, R. Ir. Rif.; Sec. Lt. (on prob.) H. MacKenzie, R. Lanc. R., Spec. Res.; Sec. Lt. (on prob.) H. J. Gearing, High. L.I., Spec. Res.; temp. Sec. Lt. L. S. Ward-Price, Res. R. of 2nd L. Gds.; Sec. Lt. W. G Helpman, K.E. Horse, Spec. Res.; temp. Sec. Lt. J. D. Seal, temp. Sec. Lt. S. K. Muir, temp. Sec. Lt. W. L. Joseph, temp. Sec. Lt. D. W. Clappen; Sec. Lt. W. E. G. Bryant, R. Fus.; temp. Sec. Lt. O. D. Norwood; temp. Sec. Lt. J. T. Collier; temp. Sec. Lt. G. A. F. Layton; temp. Sec. Lt. J. W. L. Birkbeck; temp. Sec. Lt. T. A. Cooch, attd. Worc. R.; temp. Sec. Lt. R. D. C. Blake, Dec. 1st.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—W. H. Doré, from Lt., 32nd Canadian Inf., to be Lt., Dec. 23rd. Sec. Lt. J. G. Bulger is cashiered by sentence of a General Court-Martial, Nov. 19th. (Substituted for the notification in "Gazette" of Dec. 15th, under the heading of Royal Field Artillery). Sec. Lts. (on prob.) are confirmed in their rank:—H. Hoad, L. L. Carter, F. W. Keddie, W. E. Jones. To be Sec. Lts. (on prob.):—B. E. Harris, H. R. Mosenthal, W. A. Sievwright, Dec. 8th. J. H. F. Pilling, N. R. Norman, C. R. Needs, T. H. Earton, D. A. Jardine, J. L. Bradford, G. E. Creighton, J. P. Macdonald, Dec. 12th.

TERRITORIAL FORCE.—R.F.C.—C. A. Walker-Leigh (late temp. Maj.) to be Capt. (temp.) and Adjt., Dec. 29th.

* * *

From the "London Gazette," Friday, Dec. 29th, 1916.

War Office, Dec. 29th.

REGULAR FORCES.—Warrant N.C.Os. and Men to be temp. Sec. Lts. (on prob.), for service in the field:—

Memoranda.—For duty with R.F.C.—Sgt. W. G. Ivamy, from R.E.; Sgt. A. J. Packham, from R.E.; Cpl. R. C. Doughty, from R.E.; Cpl. H. H. Rickie, from R.E.; Cpl. E. C. Morris, from R.E., November 28th. Sgt. A. B. Coupal, from R.F.C.; Sgt. W. F. Macdonald, from R.F.C.; 2nd Cl. Air Mech. W. A. Winter, from R.F.C., Dec. 2nd.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdrs.—From Flying Officers, and to be temp. Capts. while so empld.:—Temp. Sec. Lt. R. M. Hill, M.C., Gen. List, Temp. Sec. Lt. H. Meintjes, Gen. List, Dec. 11th. Lt. A. FitzR. P. H. Somerset-Leeke, Spec. Res., Dec. 19th.

Adjutant.—Temp. Capt. (temp. Maj.) A. R. Martin, from Adjutant, Hamps. Aircraft Parks, T.F., vice temp. Capt. F. A. Forde, Gen. List, Dec. 14th.

Park Comdr.—Qrmr. and Hon. Lt. (temp. Capt.) G. Laing, R.F.C., from an Equipment Officer, 1st Cl., Nov. 1st.

Equipment Officer, 3rd Cl.—Temp. Sec. Lt. (on prob.) P. A. Rich, Gen. List, Oct. 17th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on prob.) the Hon. F. W. S. McLaren relinquishes his commission on account of ill-health, Dec. 30th.

The "London Gazette" of Dec. 29th announces, under date Dec. 28th, that the King has been pleased, by Letters Patent under the Great Seal of the United Kingdom of Great Britain and Ireland, bearing date December 14th, to re-appoint Maj.-Gen. (temp. Lieut.-Gen.) Sir David Henderson, K.C.B., D.S.O., to His Majesty's Army Council.

A Supplement to the "London Gazette" published on Dec. 29th contains a dispatch from General Sir Douglas Haig, G.C.B., Commander-in-Chief of the British Forces in France, dated from General Headquarters, Dec. 23rd, 1916.

The dispatch deals with the operations in France since May 19th, 1916, the date of the last dispatch.

Various references are made to the work of aircraft, and note is made of the use of aeroplanes in surveying the important defences prepared by the Germans along the British front.

Special mention is made of operations against kite-balloons as follows:—

> On June 25th the Royal Flying Corps carried out a general attack on the enemy's observation balloons, destroying nine of them, and depriving the enemy for the time being of this form of observation.

The following mention is made of the preparations for the big attack in the early part of July:—

> The nature of the ground limited the possibility of direct observation by our artillery fire, and we were consequently much dependent on observation from the air. As in that element we had attained almost complete superiority, all that we required was a clear atmosphere; but with this we were not favoured for several weeks. We had rather more rain than is usual in July and August, and even when no rain fell there was an almost constant haze and frequent low clouds.

Describing the attack on Gueudecourt on Sept. 26th, General Haig says:—

> In the early morning a "Tank" started down the portion of the trench held by the enemy from the north-west, firing its machine-guns and followed by bombers. The enemy could not escape, as we held the trench at the southern end. At the same time an aeroplane flew down the length of the trench, also firing a machine-gun at the enemy holding it. These then waved white handkerchiefs in token of surrender, and when this was reported by the aeroplane the infantry accepted the surrender of the garrison. By 8.30 a.m. the whole trench had been cleared, great numbers of the enemy had been killed, and eight officers and 362 other ranks made prisoners. Our total casualties amounted to five.

The section dealing with the work of the R.F.C. reads thus:—

> In this combination between infantry and artillery the Royal Flying Corps played a highly important part. The admirable work of this Corps has been a very satisfactory feature of the battle.
>
> Under the conditions of modern war, the duties of the Air Service are many and varied. They include the regulation and control of artillery fire by indicating targets and observing and reporting the results of rounds; the taking of photographs of enemy trenches, strong points, battery positions, and of the effect of bombardments; and the observation of the movements of the enemy behind his lines.
>
> The greatest skill and daring has been shown in the performance of all these duties, as well as in bombing expeditions. Our Air Service has also co-operated with our infantry in their assaults, signalling the position of our attacking troops and turning machine-guns on to the enemy infantry and even on to his batteries in action.
>
> Not only has the work of the Royal Flying Corps to be carried out in all weathers and under constant fire from the ground, but fighting in the air has now become a normal procedure in order to maintain the mastery over the enemy's air service.
>
> In these fights the greatest skill and determination have been shown, and great success has attended the efforts of the Royal Flying Corps.
>
> I desire to point out, however, that the maintenance of mastery in the air, which is essential, entails a constant and liberal supply of the most up-to-date machines, without which even the most skilful pilots cannot succeed.

[The words underlined are particularly noteworthy, as they imply, for the first time, a warning from the Commander-in-Chief in France to those responsible for output of war material at home. If they are not intended to carry such a warning they are superfluous, and it is not General Haig's way to indulge in superfluous verbiage. One may therefore, perhaps, be forgiven for expressing satisfaction that such strong confirmation has been given of the policy which this paper has pursued without ceasing since long before the war began, the policy of fighting for a liberal supply of the most up-to-date machines for the Royal Flying Corps.—Ed.]

The dispatch states that references to individual rewards have been forwarded separately, and that they will be published in due course.

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From the "London Gazette" Supplement, Dec. 30th, 1916.

War Office, Dec. 30th.

REGULAR FORCES.—TERRITORIAL FORCES.—Infantry.—Cyclist Bn.—Sec. Lt. C. B. Carr is seconded for duty with the R.F.C., Dec. 13th.

From the "London Gazette" Supplement, Jan. 1st, 1917.

(Issued on December 31st for publication on January 1st.)

[The Naval Honours and Special Promotions for the New Year will be found in their correct position in the list of R.N.A.S. Honours on page 60.—Ed.]

The King has been pleased to approve of the following rewards for distinguished service in the field, dated January 1st, 1917:—

To be Major-General.

Maj. and Bt. Col. (temp. Maj-Gen.) H. M. Trenchard, C.B., D.S.O., A.D.C., R. Sc. Fus.

To be Brevet-Colonel.

Lt.-Col. (temp. Brig.-Gen.) E. B. Ashmore, C.M.G., M.V.O., R.A.

To be Brevet Lieutenant-Colonels.

Capt. and Bt. Maj. (temp. Brig.-Gen.) C. A. H. Longcroft, Welsh Regt. and R.F.C.
Maj. C. C. Maradin, R.G.A.
Maj. (temp. Brig.-Gen.) D. Le G. Pitcher, Ind Army and R.F.C.
Maj. (temp. Brig.-Gen.) T. I. Webb-Bowen, Beds R. and R.F.C.
Capt. (temp. Lt.-Col.) J. G. Hearson, D.S.O., R.E., and R.F.C.
Capt. (temp. Lt.-Col.) P. L. W. Herbert, Notts and Derby R. and R.F.C.
Capt. (temp. Lt.-Col.) E. R. Ludlow-Hewitt, M.C., R. Ir. Rifles and R.F.C.

To be Honorary Captain.

Qrmr. and Hon. Lt. (temp. Maj.) F. H. Kirby, V.C., R.F.C.

The Distinguished Service Order.

Lt. (temp. Maj.) Edgar James Bannatyne, Hrs. and R.F.C.
Maj. (temp. Lt.-Col.) John Harold Whitworth Becke, Notts and Derby R. and R.F.C.
Maj. Arthur Burdett Burdett, York and Lanc. R. and R.F.C.
Capt. (temp. Maj.) Thomas Algar Elliott Cairnes, D. Gds. and R.F.C.
Capt. (temp. Maj.) John Adrian Chamier, Ind. Army and R.F.C.
Temp. Maj. Frederick Holden Cleaver, Spec. List and R.F.C.
Maj. (temp. Lt.-Col.) George William Patrick Dawes, R. Berk. R. and R.F.C.
Capt. (temp. Lt.-Col.) Ralph Charles Donaldson-Hudson, T.F. Res. and R.F.C.
Capt. (temp. Lt.-Col.) Alfred Huggins, R.F.C., Spec. Res.
Capt. (temp. Maj.) George Bayard Hynes, R.A. and R.F.C.
Capt. (temp. Lt.-Col.) Philip Bennet Joubert de la Ferté, R.A. and R.F.C.
Capt. (temp. Maj.) William Foster MacNeece, R.W. Kent R. and R.F.C.
Capt. (temp. Lt.-Col.) Cyril Francis de Sales Murphy, M.C., R. Berks. R. and R.F.C.
Maj. Sidney Smith, R.F.A. and R.F.C.

* * *

A further Supplement to the "London Gazette," for Jan. 1st, 1917, states:—

The King has been pleased to approve of the following rewards for distinguished service in the field, dated Jan. 1st, 1917:—

The Military Cross.

Capt. (temp. Maj.) Robert Graeme Cherry, R.F.A. and R.F.C.
Temp. Lt. (temp. Capt.) Cyril Danby, Gen. List and R.F.C.
Temp. Maj. Thomas Edward St. Clare Danniell, Gen. List and R.F.C.
Temp. Capt. John Ogilvie Davis, R.F.C.
Qrmr. Hon. Lt. and temp. Maj. Albert Fletcher, R.F.C.
Temp. Capt. Alastair Cosmo Burton Geddes, Gen. List and R.F.C.
Capt. Napier John Gill, R.A. and R.F.C.
Temp. Sec. Lt. (temp. Lt.) Gilbert Ware M. Green, R.F.C.
Capt. Richard Raymond de Cruce Grubb, Hrs. and R.F.C.
Sec. Lt. (temp. Capt.) Cuthbert Ambrose Anthony Hiatt, Norf. R. and R.F.C.
Lt. (temp. Capt.) Frank Hudson, R.F.C., Spec. Res.
1717 Sgt.-Maj. Charles Henry Kernot, R.F.C.
Capt. Hubert Le Jeune, R.F.C., Spec. Res.
Capt. (temp. Maj.) Rutter Barry Martyn, Wilts R. and R.F.C.
Temp. Lt. (temp. Capt.) Reginald Stewart Maxwell, Gen. List and R.F.C.
Qrmr. and Hon. Lt. (temp. Maj.) John Mead, R.F.C.
Capt. (temp. Maj.) William Gore Sutherland-Mitchell, High. L.I. and R.F.C.
Capt. Allen Handfield Morton, R.F.A. and R.F.C.
Lt. (temp. Maj.) Herbert Anselm Oxenham, Spec. Res., R.F.C.
Lt. Ernest William John Payne, Spec. Res., R.F.C.
Sec. Lt. Charles Robinson Robbins, R.A. and R.F.C.
Temp. Lt. (temp. Capt.) Percy Gilbert Ross-Hume, Gen. List and R.F.C.
Lt. John Cotesworth Slessor, R.F.C., Spec Res.
Sec. Lt. (temp. Capt.) Bestine E. Sutton, Yeo. and R.F.C.
Qrmr. and Hon. Lt. William Thomas, R.F.C.
Sec. Lt. (temp. Capt.) J. T. Whitaker, A.S.C. and R.F.C.

Distinguished Conduct Medal.

333 A.S.-M. R. A. Baughan, R.F.C.
1336 Sgt. D. R. Baxter, R.F.C.
241 A.-S.-M. L. E. Carter, R.F.C.
891 A.S.-M. F. Eldridge, R.F.C.
723 F.-Sgt. H. A. Gamon, R.F.C.
54 A.S.-M. J. C. Jones, R.F.C.
1739 A.S.-M. C. Marley, R F.C.

Meritorious Service Medal.

5011 Sgt. G. H. Bicknell, R.F.C.
6217 Cpl. F. A. W. Braine, R.F.C.
2570 Sgt. J. C. Cooper, R.F.C.
6629 Cpl. (Actg. Sgt.) W. R. Dandy, R.F.C.
3810 F.-Sgt. C. W. Durman, R.F.C.
80 Sgt. (A.-S.-M.) E. Fowles, R.F.C.
255 Sgt. (A.-S.-M.) W. C. Hayward, R.F.C.
3724 Sgt. H. A. Hemming, R.F.C.
3892 Flt. Sgt. H. I. Hooper, R.F.C.
3682 1st Air Mech. T. Horton, R.F.C.
1416 Flt. Sgt. C. J. Howard, R.F.C.
209 A.-S.-M. E. H. Metz, R.F.C.
64 A.-S.-M. C. Mullen, R.F.C.
7134 1st C. Air Mech. O. S. Singleton, R.F.C.
1498 Flt. Sgt. E. F. Smith, R.F.C.
3793 Sgt. H. B. Stringer, R.F.C.
1428 Flt. Sgt. R. J. Tallyn, R.F.C.
2639 Flt. Sgt. L. Wardley, R.F.C.
7649 Sgt. F. A. Woodall, R.F.C.

* * *

War Office, Jan. 1st.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed:—Sec. Lt. (on prob.) G. H. Bonnell, R.F.A., Spec. Res., Dec. 11th, 1916. Sec. Lt. G. C. Bailey, Spec. Res., Dec. 17th, 1916. Lt. (temp. Capt.) A. J. L. Scott, Suss. Yeo., T.F., from a R.F.C. Staff Officer, 2nd Cl., and to retain temp. rank whilst so empld., Dec. 18th, 1916, seny. from Feb. 1st, 1915.

Flying Officers.—Sec. Lt. C. W. Elliott, Spec. Res., from an Equipment Officer, 3rd Cl., Nov. 1st, 1916. Lt. W. A. Bishop, Canadian Gen. List, Dec. 8th, 1916. Temp. Lt. G. G. Campbell, R.A., and to be transfd. to the Gen. List; temp. Sec. Lt. J. E. Hunt, Gen. List; temp. Sec. Lt. A. D. C. Browne, 11th R. Innis. Fus., and to be transfd. to the Gen. List, Dec. 9th, 1916. Temp. Sec. Lt. G. M. Hopkins, Gen. List, Dec. 10th, 1916. Lt. R. Duncan, 32nd (Res.) Canadian Inf. Bn.; temp. Sec. Lt. W. A. L. Poundall, M.C., S. Lan. R.; temp. Sec. Lt. A. Morgan, Gen. List, Dec. 11th, 1916. Sec. Lt. G. A. Exley, 5th Yorks L.I., T.F., from a Flying Officer (Observer), seny. from June 19th, 1916. Temp. Sec. Lt. F. Beaumont, Gen. List, from a Flying Officer (Observer), seny. from June 21st, 1916. Temp. Sec. Lt. F. Adams, Gen. List; temp. Lt. McC. B. Watson, R.E.; Lt. N. Sales, 3rd Yorks L.I., Spec. Res., from Machine Gun Corps, and to remain secd.; Sec. Lt. M. Burbidge, R.F.A., T.F.,; Sec. Lt. N. H. Colson, Spec. Res., Dec. 12th, 1916. Temp. Sec. Lt. (on prob.) G. Eastwood, Gen. List; Sec. Lt. B. L. Blofeld, 5th R.W. Kent R., T.F., Dec. 13th, 1916. Sec. Lt. E. M. Milling, Spec. Res.; temp. Sec. Lt. E. P. Wilmot, Gen List, Dec. 14th, 1916.

Flying Officer (Observer).—Sec. Lt. (temp. Lt.) J. W. Brown, R.A., and to be secd. April 5th, 1916.

Equipment Officers, 3rd Cl.—Sec. Lt. C. W. Elliott, Spec. Res., from July 17th to Oct. 31st, 1916. Lt. (temp. Capt.) T. H. Vitty, Lond. Electrical Engrs., R.E., T.F., Oct. 1st, 1916. Sec. Lt. E. I. David, Spec. Res., Nov. 1st, 1916. Sec. Lt. W. G. Cleghorn, R.G.A., T.F., Nov. 11th, 1916.

Infantry.—N. Lan. R.—Temp. Sec. Lt. H. Bowker, from Gen. List, R.F.C., to be temp. Sec. Lt. (attd.), Jan. 2nd, 1917, seny. July 7th, 1916.

Memorandum.—Sgt. Maj. W. E. Smith, from R.F.C., to be temp. Sec. Lt. (on prob.) for duty with the Mil. Wing of that Corps, Dec. 13th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—The following Sec. Lts. (on prob.) are confirmed in their rank:—N. H. Colson, E. I. David, E. M. Milling, C. W. Elliott.

TERRITORIAL FORCE.—R.E.—Sec. Lt. (temp. Lt.) C. Butler is secd. for duty with R.F.C., Sept. 20th, 1916.

FROM THE COURT CIRCULAR.

Buckingham Palace, Dec. 30th.

The following Officers had the honour of being received by the King this morning, when His Majesty conferred decorations as follows:—

The Military Cross.

Capt. Ralph Jarvis, R.F.C.
Lt. Charles Bird, R.F.A. and R.F.C.
Sec. Lt. Laurence Scott, R.F.C.

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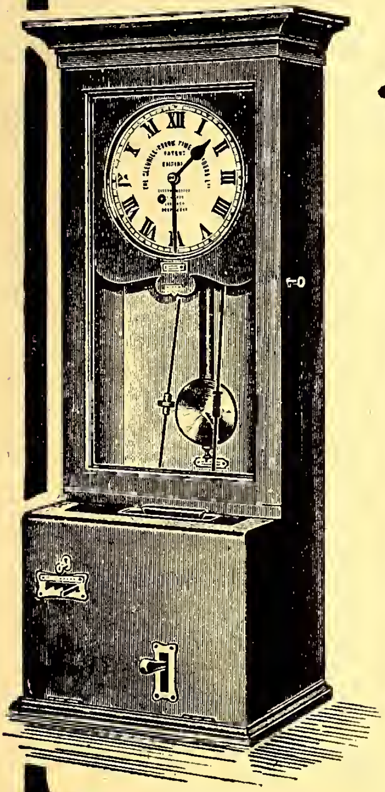

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NAVAL.

The following appointments are made in the R.N.A.S. :—

Dec. 23rd.—Air Mechs.—G. G. Speight (1st grade) and C. A. Stephenson (2nd grade), both promoted to rank of Sub-Lt. (R.N.V.R.), temp., seny. Dec. 20th, and apptd. to "President," addl., for R.N.A.S.

Ch. Petty Officer.—A. G. Osmonde, promoted to Sub-Lt. (R.N.V.R., temp.), seny. Dec. 20th, and apptd. to "President," addl., for R.N.A.S.

The following entries as Proby. Flt. Officers (Tempy.) have been made :—P. Wickens and P. B. Adderley, both seny. Nov. 22nd, and apptd. to "President," addl., for R.N.A.S., Nov. 30th. E. H. F. Scott, seny. Dec. 21st, and apptd. to "President," addl., for R.N.A.S.; H. R. de Wilde, seny. Dec. 27th. J. F. Mead and J. B. Bowes, seny. Dec. 31st, and both apptd. to "President," addl., for R.N.A.S., Dec. 31st.

Temp. commissions (R.N.V.R.) have been granted to the following, seny. as stated :—Lt.—A. W. F. Smith, Dec. 21st. Sub-Lts. :—J. E. Haswell, Dec. 12th. L. W. Rodd and F. C. F. Baldwin (all Dec. 21st, and all apptd. to "President," addl., for R.N.A.S.)

Dec. 27th.—Lt. S. P. Colt and Sub-Lts. (temp., R.N.V.R.) N. P. Playford and G. P. C. Greene, all apptd. Proby. Flt. Officers (Tempy.), seny. Dec. 23rd.

The following have been entered as Proby. Flt. Officers (Temp.), seny. Dec. 31st, and apptd. to "President," addl. :—L. A. Jessop, F. Bray, K. F. Hilder, M. S. Varden, W. D. Cliffen, and J. W. P. Amos.

Dec. 29th. — Flt. Sub-Lts. (temp.).—C. R. Carr, W. G. McMinnies, W. Haggan, and E. J. B. How, all promoted to Act. Flt. Lts. (temp.), seny. Dec. 24th.

Proby. Flt. Sub-Lts.—H. Burns and E. V. White, granted temp. comms. as Sub-Lts. (R.N.V.R.), seny. Dec. 27th, and both apptd. to "President," for R.N.A.S.

Chief Petty Officer—R. Champness, granted a temp. comm. as Sub-Lt. (R.N.V.R.), seny. Dec. 6th, and apptd. to "President," addl., for Transport duties with R.N.A.S.

The following have been entered as Proby. Flt. Officers (temp.), seny. as stated, and all apptd. to "President," for R.N.A.S. :—F. A. Major and W. N. Smith, Nov. 30th; A. G. Hodgson, Nov. 28th; H. A. Coon and W. W. Pitt, Dec. 7th.

Jan. 2nd.—The undermentioned have been entered as Proby. Flt. Officer (temp.), seny. as follows, and all apptd. to "President" for R.N.A.S. :—A. Nightingale, Dec. 31st; E. H. Kendall, F. Benzies, A. M. Alexander, B. M. J. Davis, S. S. Flook, T. O. Simpson, O. E. Worsley, A. S. Readwin, and H. F. Potter, all Jan. 14th.

Admiralty Communiqués.

Dec. 29th.—On the 26th inst. a squadron of naval aeroplanes bombarded enemy camps at Galata (Gallipoli) [on the Dardanelles, below Gallipoli Town] with excellent results.

On the 27th inst. a squadron of naval seaplanes attacked and destroyed Chikaldir Bridge, 18 miles east of Adana.

The Casualty List.

Reported Dec. 30th.

Accidentally Injured.—Minifie, Flt. Lt. James E., R.N. Hewson, Flt. Sub-Lt. George C. V., R.N.

* * *

PERSONAL NOTICES.

Marriages.

McHARDY—SHULDAM-LEGH.—On Dec. 20th Flight Lieut. Graham Goodenough McHardy, R.N., younger son of Captain Hardy McHardy, R.N., of Thornbury, East Liss, was married at St. Mary's, The Boltons, S.W., to Frances Valencia, only daughter of the late Col. H. Shuldam-Legh, M.V.O.

* * *

LIDDERDALE—WALKER.—On Dec. 16th Flight Commander J. H. Lidderdale, R.N., son of Dr. and Mrs. Lidderdale, of Prestbury, Gloucestershire, was married to Maud, daughter of Mr. and Mrs. Hanson Walker, of 2, Queen's Elm Square, Chelsea, S.W., by the Rev. Prebendary Swayne, assisted by the Rev. Noel Lidderdale, at St. Peter's, Cranley Gardens.

Flight Commander Lidderdale, a Paymaster, R.N., was Secretary to Commodore Godfrey Paine, M.V.O., R.N.—then Capt. —when the Central Flying School was founded, and he has done much good organising work. All the early Service aviators will join in wishing him and his bride every happiness.

Birth.

MOSSMAN.—On Dec. 28th, at Rosebank, Cowley Road, Uxbridge, Constance, wife of G. C. Mossman, R.N.A.S., of a daughter.

MILITARY.

G.H.Q. Communiqués.

Dec. 22nd, 10.2 p.m.—Yesterday during the few bright intervals our aeroplanes co-operated successfully with our artillery. One of our machines has not returned.

Dec. 26th, 11.10 p.m.—On the night of the 24th-25th our aeroplanes carried out successful bombing operations against places of military importance behind the enemy's lines.

Dec. 27th.—10.0 p.m.—Yesterday much successful work was performed by our aviators in co-operation with our artillery. A number of fights took place in the air, in the course of which one hostile machine was destroyed and five others were forced to land in a damaged condition.

Three of our machines are missing.

Dec. 28th.—10.10 p.m.—A number of fights took place in the air yesterday. Three hostile machines were destroyed, and three others were driven down in a damaged condition.

Dec. 29th, 10.52 p.m.—In spite of adverse weather conditions some successful work was carried out yesterday by our aeroplanes in conjunction with our artillery. One of our machines has not returned.

* * *

War Office Communiqués.

Dec. 23rd.—The General Officer Commanding the British Forces in Mesopotamia reports :—

On the morning of 21st inst. British aeroplanes dropped nearly a ton of explosives on the Turkish advanced base and shipping near Baghela (25 miles west of Kut, and about twice as far upstream by the winding course of the Tigris).

On the same day hostile trenches on the south bank of the Tigris near Kut and on the north bank at Sanna-i-Yat were subjected to a heavy artillery bombardment. Aeroplane observers reported that both bombardments were very effective.

At dawn on 22nd a second aeroplane raid on the Turkish base near Baghela was successfully carried out.

Dec. 23rd.—The General Officer Commanding the British Forces in Egypt reports :—

On Dec. 22nd our aircraft carried out several successful raids in the El Arish region (29 miles from the Turco-Egyptian frontier). At Magdhaba (south-east of El Arish and 25 miles from the frontier) about a ton of high explosives was dropped on an enemy concentration, causing many casualties to personnel.

Dec. 24th.—The General Officer Commanding the British Forces in Greece reports :—

On our Doiran front our aircraft carried out a successful bombing attack on Xanth station and enemy transport collected there. One enemy aeroplane was destroyed and a second driven down by our aeroplanes.

Dec. 24th.—The General Officer Commanding the British Forces in Egypt reports :—

On the afternoon of Dec. 23rd our mounted troops carried a strong enemy position at Magdhaba (20 miles south-south-east of El Arish) after an engagement which commenced at 9 a.m.; 500 prisoners were taken.

Aircraft co-operated in the attack, both with bombs and with machine-gun fire from a low altitude.

Dec. 25th.—The General Officer Commanding the British Forces in Egypt reports :—

Our aeroplanes are continuing to harass the enemy.

* * *

A Royal Warrant, issued as an Army Order on Dec. 22nd, amends the rates of pay for warrant officers, non-commissioned officers, and men of the Royal Flying Corps employed as clerks in that arm to the following :—Superintending clerk, 6s. 9d.; flight sergeant, 5s. 6d.; sergeant, 4s. 9d.; corporal, 4s.; 1st class air mechanic, 3s.; 2nd class air mechanic, 2s.; 3rd class air mechanic, 1s. 8d.

These rates shall not apply to soldiers now serving as clerks, who will continue to draw their present rates as long as they serve in their present ranks. On promotion, however, they shall be paid the rates now laid down, unless in any case the rate they are now drawing is higher than the new rate of the rank to which they are promoted. In that case they may continue to draw the rate they are now drawing.

* * *

The Casualty List.

Reported Dec. 23rd.

Previously reported Missing, now reported Prisoner in German Hands.—Copeland, Lieut. A. H. M., Canadian A.S.C., attd. R.F.C.

Killed.—R.F.C.—Watts, 2073 1st Cl. Air Mech. O. F. (Birmingham).

Died of Wounds.—R.F.C.—Chiverton, 41060 2nd Cl. Air Mech. J. W. (Fulham, S.W.).

Reported Dec. 26th.

Previously reported Missing, now reported Killed.—Hart, Capt. C. J., Worcestershire Regt. and R.F.C.

Wounded.—Greenwood, Lt. J. P., A.S.C., attd. R.F.C.

Thomson, Sec. Lt. T., Argyll and Sutherland Highlanders, attd. R.F.C.

Ainscow, Sec. Lt. J. A., R. Warwickshire Regt., attd. R.F.C.

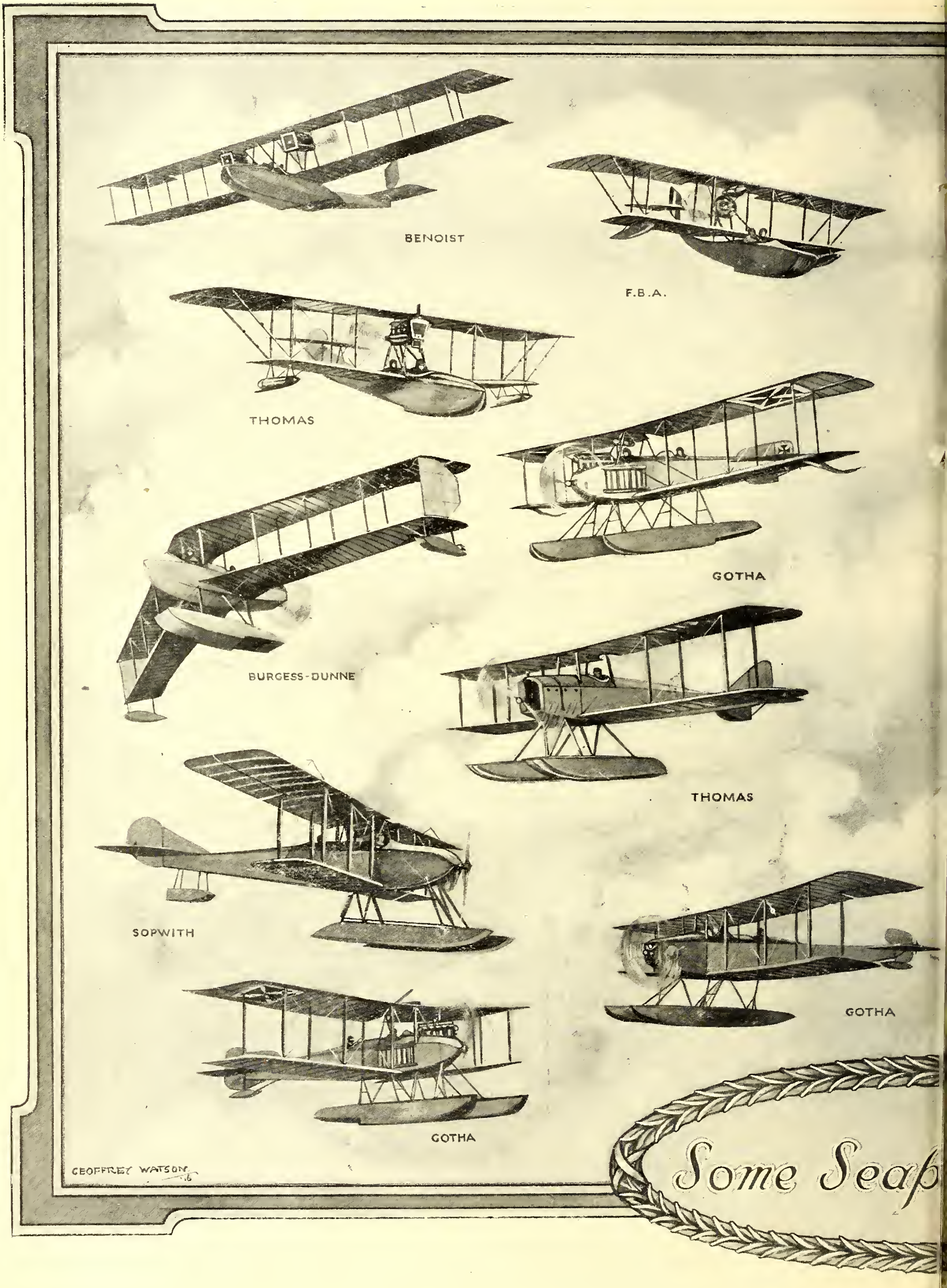
Reported Dec. 30th.

Killed.—Brereton, Sec. Lt. H., R.F.C.

Wounded.—Britton, Sec. Lt. W. K. M., R. Munster Fus., attd. R.F.C.

Missing.—Cotton, Lt. W. M. V., R.F.C.

D'Arcy, Sec. Lt. L. G., Connaught Rangers, attd. R.F.C.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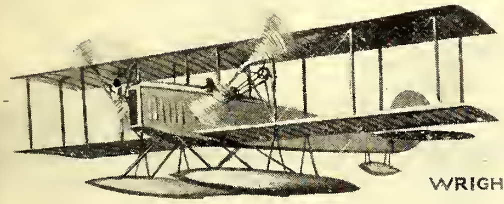
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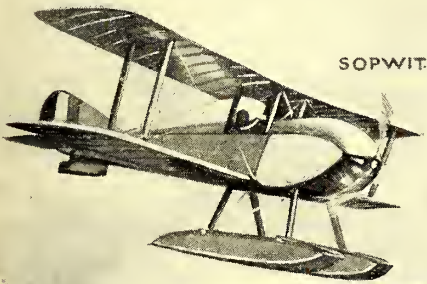
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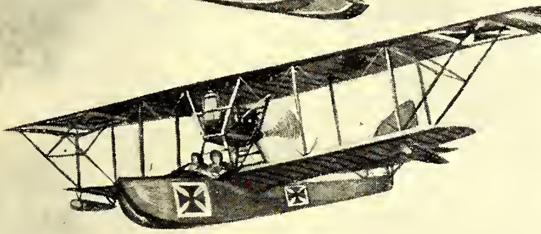
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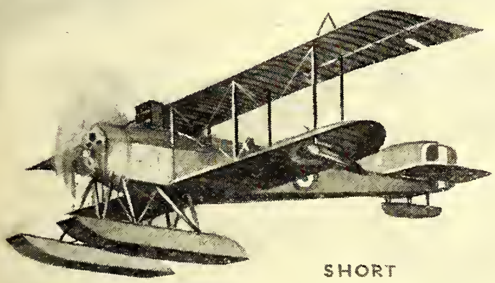
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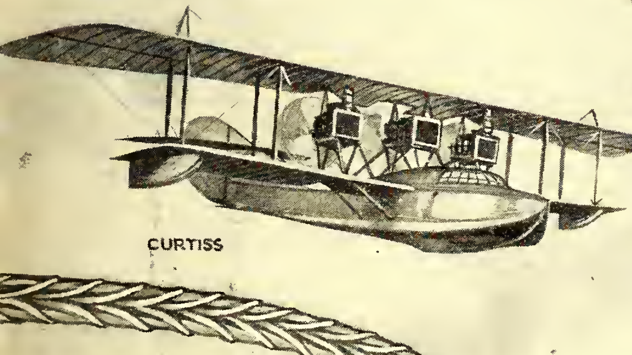
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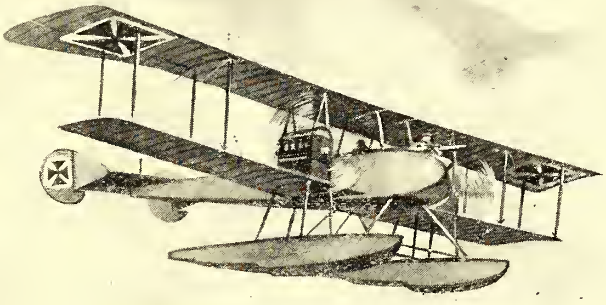
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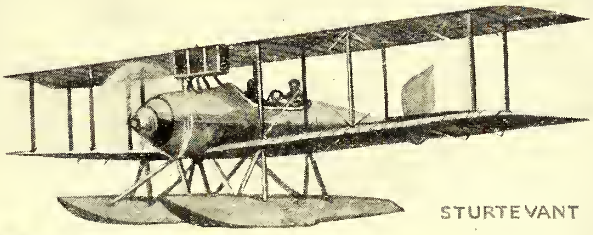
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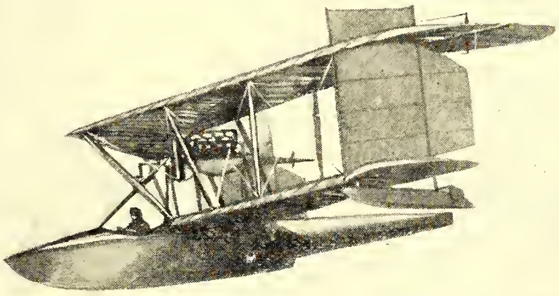
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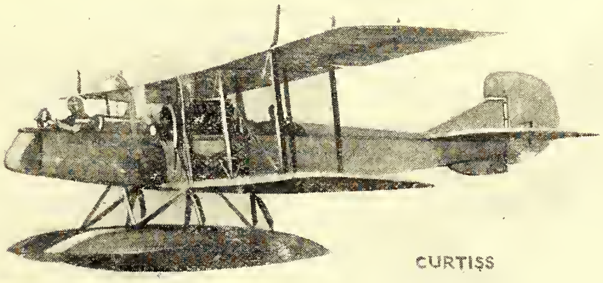
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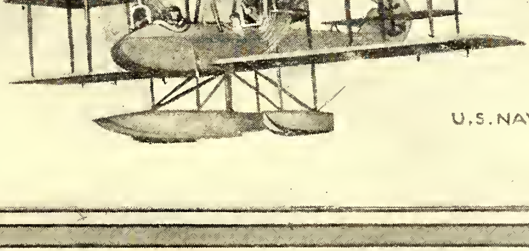
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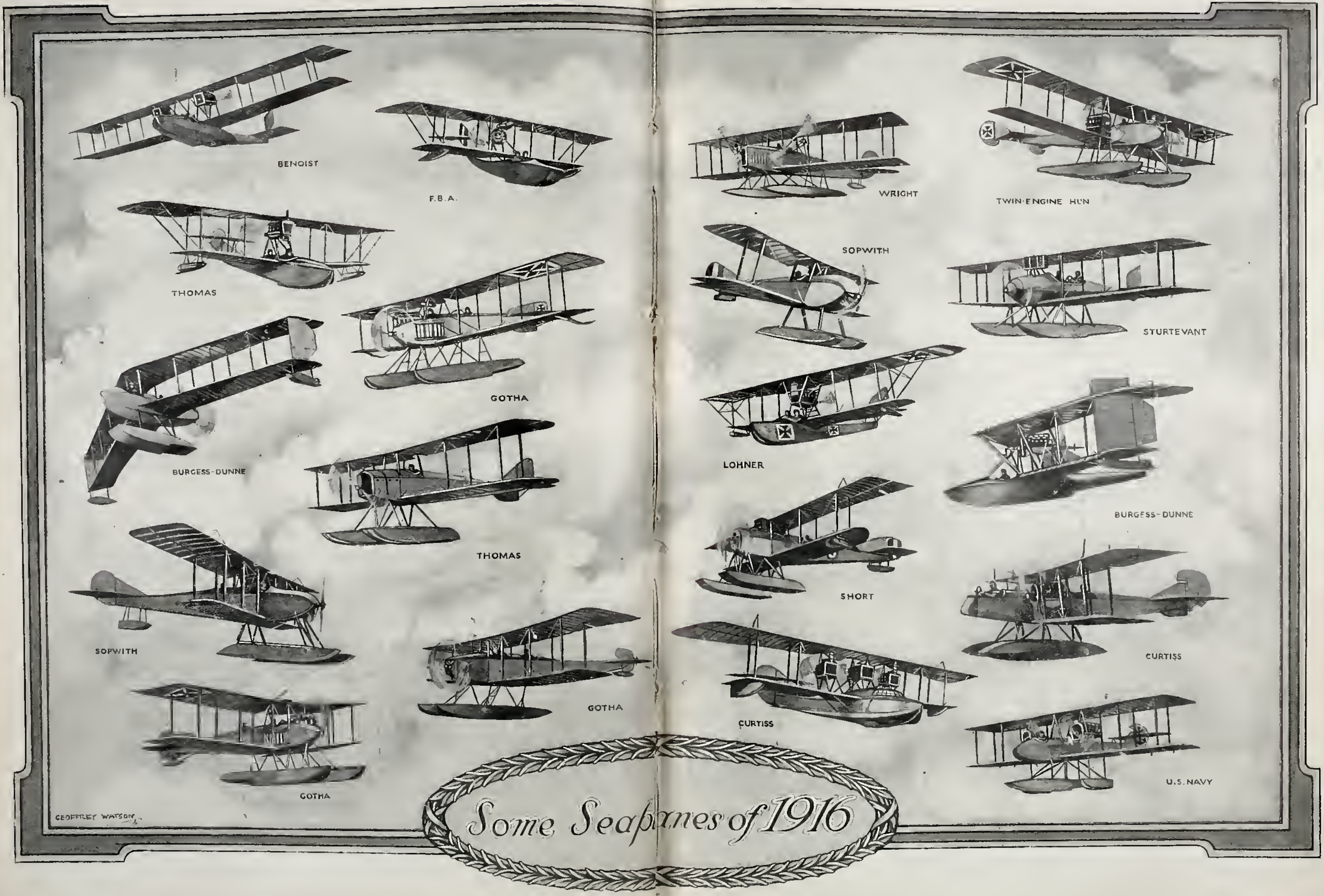

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Fiske, Sec. Lt. N., R.F.C.
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Knight, Capt. A. G., R.F.C.
Smith, Lt. R., E. Surrey Regt., attd. R.F.C.
Windrum, Lt. C. H., R.W. Kent Regt., attd. R.F.C.

Previously reported Missing, now reported Died of Wounds as a Prisoner in German Hands.—Thompson, Sec. Lt. H., R.F.C.

Previously reported Missing, now reported Prisoners in German Hands.—Anderson, Lt. A., Connaught Rangers and R.F.C.
Clarke, Sec. Lt. T. H., Army Ordnance Dept., attd. R.F.C.
Cook, Sec. Lt. L. C. L., A.S.C., attd. R.F.C.

OVERSEA FORCES.—Wounded.—Boger, Lt. W. O., Canadian Cavalry, attd. R.F.C.

Reported Jan. 1st.

Previously reported Missing, now reported Killed.—Wilson, Sec. Lt. J. C., Black Watch and R.F.C.

Wounded.—Jones, Sec. Lt. T. B., R.F.C.
Kellogg, Lt. W. B., R.F.C.

Missing.—Davis, Lt. D. W., Canadian General List, attd. R.F.C.

Reported Jan. 2nd.

Previously reported Missing, now reported Killed.—Hedderwick, Sec. Lt. G., Dragoon Gds., attd. R.F.C.
Lawledge, Sec. Lt. F. M., R.E. and R.F.C.
Sturrock, Sec. Lt. T. G. G., R. Scots, attd. R.F.C.
Tidswell, Capt. C. R., Dragoons and R.F.C.

Accidentally Killed.—Pashley, Lt. H. D., R.F.C.

Wounded.—Gardener, Sec. Lt. G. C., R.F.C., attd. M.G.C.

Previously reported Missing, now reported Prisoners in German Hands.—Hallam, Sec. Lt. H. A., York and Lanc. Regt. and R.F.C.
Knight, Lt. G. F., Devon Regt. and R.F.C.
Mapplebeck, Capt. T., Liverpool Regt., attd. R.F.C.

PERSONAL NOTICES.

Deaths.

ATKINSON.—Mr. Atkinson, whose death is recorded hereafter, was the son of Dr. and Mrs. T. Renell Atkinson, of Chadwell Heath, Essex. He was educated at Chigwell School, and enlisted in the U.P.S. Battalion, Royal Fusiliers, on the outbreak of war. He served in the trenches through last winter, and was sent home last spring for a commission, which he obtained in the East Lancashire Regt.

At the Police Court, Cirencester, on Dec. 28th, the Coroner, Mr. H. Morton Ball, and a jury held an inquiry respecting the death of Mr. Noel M. H. Atkinson, Sec. Lt., East Lancashire Regiment, attached R.F.C.

It appeared that on Dec. 27th, shortly before three o'clock, Mr. Atkinson was watching the process of taking an aeroplane from its shed and starting it on its flight, and as the engine started he stepped forward and was struck by the propeller, the blow severing his right hand and smashing his head, from which injuries he survived only fifteen minutes.

The accident was witnessed by Sec. Lieut. Winckler, who said that Mr. Atkinson appeared to be in perfect health, and for what reason he stepped forward into the way of the propeller he could not divine. Asked by the foreman if he thought he was drawn into its radius by the suction caused by the propeller, Mr. Winckler said he thought it was quite possible, but he did not admit that it had happened.

The machine was in charge of Lieut. G. M. Turnbull, who, giving evidence, said he was seated at the controls. On the the machine being started the wheels slipped in the snow, and he steadied the machine and stopped it. Mechanics held the wings and it was started again. Hardly had it restarted when a peculiar vibration was felt, and witness again stopped the engine. From his seat he could not see Mr. Atkinson, and did not know that anyone had got in the way. On this second stop witness immediately jumped from his seat and found Mr. Atkinson injured as stated.

Air Mechanic Ludwig Lewis, who was near the machine and helped with the starting, said he saw Mr. Atkinson go forward, and he seemed suddenly to fall in the way and was struck by the propeller. Lewis ran for Dr. William S. Langworthy, attached to the aerodrome, who came at once, but nothing could be done to save the injured man. The Coroner, in summing-up, remarked that there was nothing to show that it was not entirely due to a mistake or accident of Mr. Atkinson himself, and no blame seemed to be attached to anyone. The jury agreed, and returned a verdict of accidental death.

* * *

BRERETON.—Lt. Herbert Brereton, R.F.C., was killed on Dec. 21st, aged 22 years. He had been on active service for 19 months, and had formerly held a commission in the Liverpool Regt. He was the only son of Mr. and Mrs. W. H. Brereton, of 24, Nottingham Place, W.

* * *

CLOVER.—Lt. Harwood Linay Clover, Royal Dublin Fusiliers, attd. R.F.C., died suddenly at a military hospital on Dec. 23rd, aged 23. He was the son of Mr. and Mrs. Isaac E. Clover, of Sudbury, Suffolk, and was Acting Adjutant.

* * *

DEIGHTON SIMPSON.—An inquest was held on Dec. 22nd on the body of Lt. H. R. Deighton Simpson, R.F.C., who was killed as the result of a flying accident in North Kent on Wednesday, Dec. 20th.

A witness stated that Mr. Simpson was an expert pilot, and had been on active service. Immediately before his fall he had looped the loop a dozen times, and then flew upside down for some distance, and then turned somersaults. Afterwards he drove along the ground at an enormous pace, and rose again suddenly, as if to loop again, when the right plane gave way as the machine was perpendicular. He righted himself and started to glide down, at first successfuly, but suddenly the machine dropped like a stone from a height of 500 ft. A verdict of "Death from misadventure" was returned. No further particulars of the accident are available.

Mr. Simpson was the eldest son of Mr. and Mrs. Henry W. Simpson, of New York, and was 20 years of age. He was one of the most brilliant pilots in the R.F.C., and gave a fine display of flying at the inauguration of the new buildings of the C.F.S., where he was then an instructor, when the Commandant entertained sundry guests of the officers. Personally he was a charming and amusing companion, and a very able mechanical engineer and physicist. His loss will be deeply felt by all who knew him.

An Eton friend writes:—"Many Eton friends must have read with sorrow of the death of Deighton Simpson. He came to Eton straight from a New York School, and never lost his American accent or a certain unconventionality which was a continual source of delight to those who knew him well. His hatred of injustice was always strong. I shall never forget his indignant protest when another lower boy, C, was punished for bullying B, when he (Deighton) had been just as bad himself. Alas! B, C, and D, all have fallen. He had gone to America for the summer holidays when war broke out, and parental arrangements were in consequence made for him to leave Eton and join Harvard. Impeccable neutrality, however, was not for him, and he took a steerage passage for Liverpool under an assumed name, with the full intention of enlisting in an English regiment. This step was rendered unnecessary by his obtaining papers of naturalisation, and after passing through Sandhurst into a cavalry regiment, he at length obtained a commission in the R.F.C., for which his natural turn for mechanics, as well as his daring, eminently fitted him. Others can speak with more authority on his flying feats. They were not insignificant, though he hated the fighting. But no Etonian ever loved justice and mercy with more devotion than this gallant American boy."

* * *

GORDON.—Sec. Lt. Bernard Vernon Gordon, R.F.C., who was accidentally killed while flying in England on Dec. 14th, aged 18, was the youngest son of the late Thomas Gordon and Mrs. T. Gordon, of Eastbourne and Sevenoaks. He received his commission direct from Eastbourne College last July.

* * *

HEDDERWICK.—Sec. Lt. Guy Hedderwick, Dragoon Guards, attd. R.F.C., was the eldest son of Mr. Philip Hedderwick, of the firm of Stanley Woodhouse and Hedderwick, solicitors, of Essex Street, Strand. He was aged 22, and was educated at Uppingham School and articled to Messrs. Budd, Johnson and Jecks, of Austin Friars, solicitors.

* * *

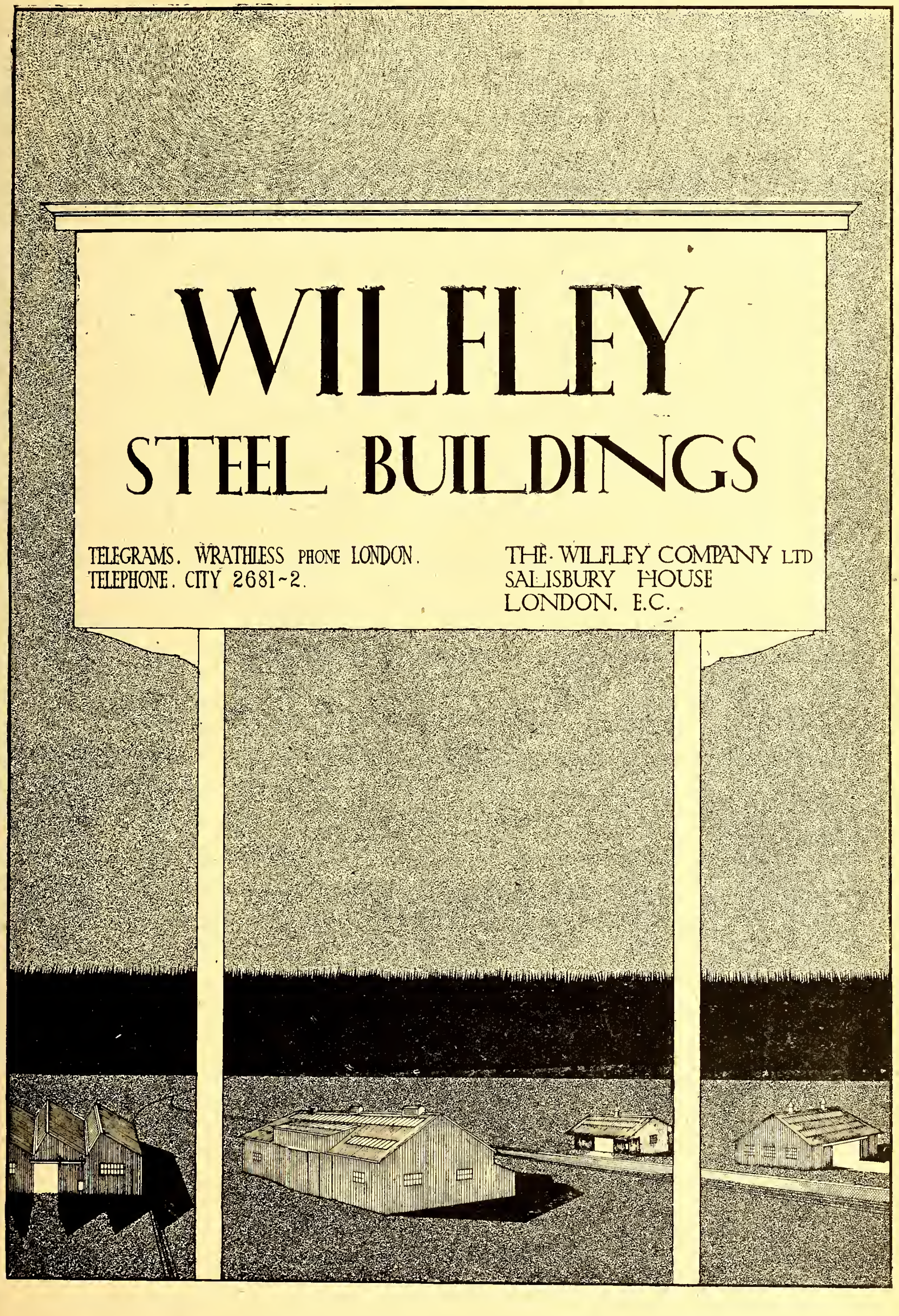
PECHELL. — On Dec. 21st, Sec. Lieut. George Douglas Pechell, I.A. Reserve of Officers, attached R.F.C., younger son of Lt.-Col. Sir Alexander Brooke Pechell, Bt., of Royal Hospital, Chelsea, S.W., was killed whilst flying.

* * *

PEMBERTON.—Capt. Alan John Macdonald Pemberton (Mac), M.C., Leinster Regt., attached R.F.C., who was missing on Nov. 3rd, and who is now reported to have been killed on that date, was the son of the late Maj.-Gen. W. W. Pemberton, I.S.C. Born in Toronto in 1892 he was educated at Fairfield, Malvern Link, and at Repton (The Priory), and obtained a commission in the Leinster Regt. in 1911. He went out to France in December, 1914, and was present at the battles of St. Eloi and Ypres. He was mentioned in dispatches, and was awarded the Military Cross. He joined the R.F.C. last January, and went to the front in October.

* * *

SUMMERS.—Capt. Alfred Spencer Mason Summers, Hussars, attached R.F.C., who was reported missing on Sept. 15th, and is now reported killed, at the age of 30, while attacking a hostile kite balloon, was the only son of the late Mr. J. W. Summers, M.P., and Mrs. Summers, of Emral Hall, Worthenbury, North Wales. He was born in 1886, and educated at Eton and Trinity College, Cambridge, where he took a first in law.



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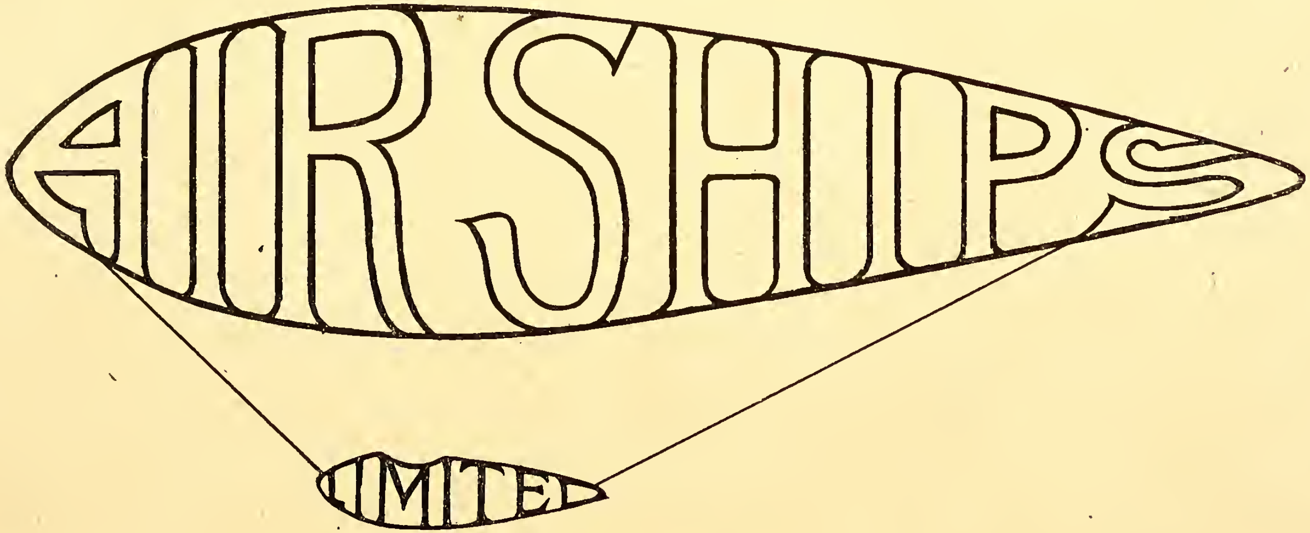

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He joined the Montgomeryshire Yeomanry, and in 1909 was gazetted to the Cavalry (Hussars), going out to the front in August, 1914, as machine-gun officer, and being mentioned in dispatches in May, 1915. In Dec., 1915, he was attached to the R.F.C., and went to the front in the following May as a Flight Commander. He was married in July, 1914, and leaves a son.

* * *

TIDSWELL.—Capt. Cecil Robert Tidswell, Dragoons and R.F.C., killed, was in his 36th year, and was the only son of Mr. and Mrs. R. H. Tidswell, of Bosmere Hall, Needham Market, and Wilton Crescent. He entered the cavalry in September, 1901, was promoted in 1904, and had his captaincy in April, 1909, while he was gazetted flight commander in the Royal Flying Corps in June of this year. Capt. Tidswell saw service before the present war in South Africa, in 1902, and received the Queen's medal with five clasps.

* * *

WRIGHT and GARNER.—Sec. Lt. P. A. Wright, R.F.C., and Sec. Lt. Frank Leslie Garner, acting as observer, were flying in a biplane on Dec. 20th, when they saw another machine in a field, and it is thought they decided to descend to see if assistance was required. Something went wrong with their engine, which stopped, and the biplane dropped from a height of 400 ft. Mr. Garner was killed immediately, and Mr. Wright died later in the day in hospital.

MARRIAGES.

HOWELL—RUSSELL.—On Dec. 19th, Charles Hurd Howell, R.F.C., was married to Margaret, daughter of the late ex-Governor William E. Russell, of Cambridge, Mass., and of Mrs. Michael Foster, of Harrogate and San Remo, at Holy Trinity Church, Cambridge, by the Rev. A. E. Stodart, Vicar of Madingley, assisted by the Rev. G. A. Chase, Chaplain to the Forces.

* * *

KEBLE WHITE—PRETTY.—The marriage took place on Wednesday, at St. Mary Stoke, Ipswich, of Captain Alister Frederick Keble White, Suffolk Regt. and R.F.C., eldest son of the Rev. A. and Mrs. Keble White, of Chevington, Suffolk, to Doris Freda, only daughter of Lieut.-Col. W. T. Pretty, T.D., D.L., Suffolk Regt., and M.F.H., and Mrs. Pretty, of The Goldrood, Ipswich. The Rev. A. L. Woodard (rector) officiated, assisted by the Rev. Lord Manners Hervey, rector of Horringen and Ickworth, Suffolk, and Rural Dean.

* * *

MOON—TWINING.—On Dec. 20th Lieut. Guy Moon, R.E., attd. R.F.C., son of Lieut. and Mrs. Moon, of Weston-super-Mare, was married to Dorothy, daughter of the late Rev. J. H. Twining, formerly Vicar of Woodford, Salisbury, and Mrs Twining, of St. Mary's, Derby Road, Bournemouth. The ceremony was performed by the Rev. W. A. Grey, at St. Martin's Church, Ruislip.

ENGAGEMENTS.

CLARKE—BAKER.—The marriage arranged between Capt. A. R. Stanley Clarke, Dorset Regt. and R.F.C., and Miss Baker will take place quietly at Almondsbury about the middle of January.

* * *

FOWLER—WATERHOUSE.—An engagement has been arranged between Lt. David D. Fowler, R.F.C., eldest son of the late James Fowler, of Dyxcroft, Rottingdean, Sussex, and Joan Audrey Waterhouse, youngest daughter of Agnes Waterhouse.

* * *

REYNELL—LIDDELL.—An engagement is announced between Capt. Harold E. Reynell, Black Watch, attached R.F.C., eldest son of Mr. H. E. Reynell, of Kobe, Japan, and Georgiana Catherine, eldest daughter of Mr. and Mrs. John Liddell, of Shanghai, China.

* * *

SPENCER—THOMPSON.—The marriage arranged between Lt. R. H. Spencer, Royal Artillery and R.F.C., son of the Rev. R. E. Spencer, late vicar of Willington, Maidstone, and Mrs. Spencer, and Molly, younger daughter of Maj. J. W. H. Thompson and Mrs. Thompson, of 2, Southwick Crescent, W., and Bratton House, Wincanton, will take place very quietly early in February.

BIRTHS.

ALLEN.—On Dec. 24th, 1916, at 37, Owlstone Road, Cambridge, the wife of Private the Rev. W. A. Campbell Allen, attd. R.F.C., of a daughter.

* * *

COOPER.—On Dec. 24th, at Upavon, Wilts, to Gladys, wife of Capt. J. P. C. Cooper, R.F.C., a daughter.

* * *

GIBBS.—On Dec. 20th, at 44, Hornton Court, Kensington, W., the wife of Herbert Gray Gibbs, R.F.C., of a son

* * *

LEIGH-MALLORY. — On Dec. 21st, at Upper Norwood, Doris (née Sawyer), wife of Capt. T. Leigh-Mallory, Lancs. Fus., attd. R.F.C., of a son.

FRANCE.

OFFICIAL COMMUNIQUÉS.

DEC. 25th.—On the Somme front three German aeroplanes were brought down by our pilots yesterday. The first enemy machine fell in flames south of Epénancourt, the second fell near Omiécourt, and the third near Liancourt (respectively east, south-east, and south of Chaulnes).

Last night one of our air squadrons bombarded the enemy aviation ground at Vraignes (south-east of Péronne), as well as the ammunition depots at Athies, Ennemain, and Mons-en-Chaussée (the first two south and the last south-east of Péronne).

DEC. 26th.—Yesterday 10 of our machines bombarded the railway station and hutments of Nesle and bivouacs in the woods of Chapitre and Ourscamps.

DEC. 27th.—It is now confirmed that Lieut. Herteux brought down his 14th enemy machine at 11.30 a.m. on Dec. 24th, between Chaulnes and Hyencourt-le-Grand.

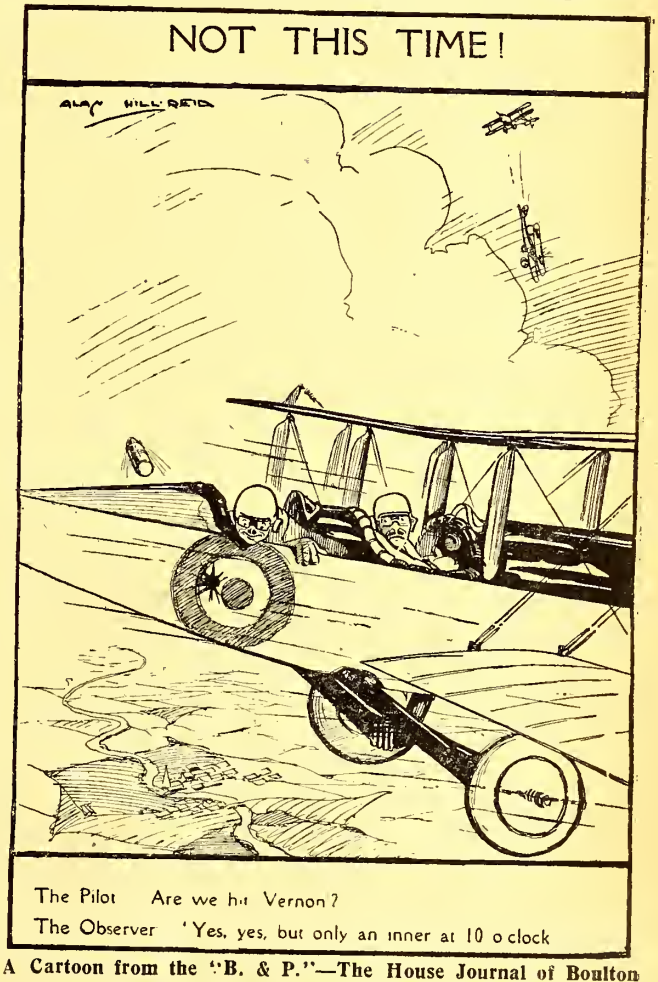
DEC. 28th.—It is confirmed that on the 26th inst. Lieut. Heurteaux brought down his 15th aeroplane over Vaux Wood. On the same day Sous-Lieut. Guynemer brought down his 24th machine east of Miséry, and his 25th on the 27th inst., 300 yards south of La Maisonette (both south of the Somme). Another German aeroplane came down after a fight with one of our pilots in the neighbourhood of Omiécourt (south-east of Chaulnes).

At 2 o'clock yesterday afternoon 13 machines of the British Naval Air Service bombarded the blast furnaces at Dillingen. Eleven hundred kilogrammes (over a ton) of projectiles were dropped.

Our Aviation Service carried out various bombardments in the course of yesterday and last night. The railway stations of Montmédy and Pierrepont, east of Longuyon, received many projectiles. Seven hundred and twenty kilogrammes (about three-quarters of a ton) of shells were also dropped on the factories of Thionville and Joeuf (Briey coalfield), 90 120 mm. shells on the blast furnaces at Rombach, and 60 on the blast furnaces at Hagondange. One of our airships bombarded the factories at Hagondange and another the ironworks at Neunkirchen.

DEC. 29th.—Lieut. Heurteaux brought down his 16th enemy machine at 11.55 a.m. on the 27th over Mangues Wood, south-east of Miséry (Somme front).

It is confirmed that on the same day our pilots brought down


NOT THIS TIME!
ALAN HILL-REID
The Pilot Are we hit Vernon?
The Observer 'Yes, yes, but only an inner at 10 o clock

A Cartoon from the "B. & P."—The House Journal of Boulton and Paul, Ltd.

four other enemy aeroplanes. One of these machines was brought down by Lieut. Loste, who thus won his sixth victory, and by Sapeur Martin, who has up to date brought down five aeroplanes.

Two of the aeroplanes destroyed during the day of the 27th, and the destruction of which was announced in to-day's communiqué, were brought down—one by Adjudant Lufbery, the other by Lieut. de la Tour. Adjudant Lufbery has so far brought down six enemy machines, and Lieut. de la Tour eight.

During the day of the 27th and the following night our bombarding aircraft dropped bombs on the aviation ground at Grisolles (south of Soissons), on the railway station of Nesle (on the Somme front), and on different munitions works, including those at Neunkirchen (north-east of Saarbrücken).

GERMANY.

OFFICIAL COMMUNIQUÉS.

DEC. 27th.—WESTERN THEATRE.—On the Ypres bend and on the northern bank of the Somme . . . In aerial fighting the enemy sustained the loss of nine aeroplanes.

ARMY GROUP OF VON MACKENSEN.—In the Dobrudja. Both airships and aerial squadrons operated with success in the rear of the enemy against important railways and port establishments.

DEC. 28th.—The activity of the aerial fighting forces was very lively. The enemy lost eight aeroplanes in aerial engagements and through the fire of our anti-aircraft guns.

* * *

It is reported from Amsterdam, Dec. 29th, that the German newspapers publish paragraphs deploring the death of the famous German aviator, Lieut. Leffers, which occurred in an air fight on Dec. 21st.

Lieut. Leffers, who held the Ordre Pour le Mérite, has not figured largely in the official reports of German Main Headquarters. His name first appeared in the communiqué of March 15th, when it was reported that he had brought down his fourth enemy machine—an English biplane—north of Bapaume. He was last mentioned on Sept. 5th, when, bracketed with Bölcke, Fahlbusch, and Rosencrantz, he was said to have distinguished himself in recent air successes. Only one of the quartette—Rosencrantz—is now alive.

RUSSIA.

OFFICIAL COMMUNIQUÉS.

DEC. 28th.—Our battery fired at an enemy aeroplane, which descended in the region of Ocna (in Moldavia, behind the Roumanian lines). The pilot and observer were taken prisoners.

ROUMANIAN FRONT.—Some enemy aeroplanes dropped bombs in the region of Perichul and Braila. In the region of the Yanka railway station on the Buzeu-Braila line a German aeroplane landed, and the officer and two soldiers were made prisoners.

AUSTRIA.

OFFICIAL COMMUNIQUÉ.

DEC. 28th.—In the Sosmezö district . . . . . Our aviators brought down in this border region two enemy Farman biplanes, and forced two other aeroplanes to descend.

ITALY.

OFFICIAL COMMUNIQUÉS.

DEC. 22nd.—Hostile aircraft attempted raids over our lines, but were promptly driven off by the fire of our anti-aircraft batteries. A few bombs were dropped on Grigno (Sugana Valley), Calalzo (Oten Valley, Piave), and Vertoiba (south-east of Gorizia), without causing casualties or damage.

DEC. 29th.—Hostile aircraft dropped bombs on Ala (Lagarina Valley) and on Tezze (Sugana Valley) [about nine miles north-east of Asiago]. No victims or damage are reported, and the aeroplanes were driven back everywhere.

* * *

Replying to an interrogation in the Upper House, the Minister for War confirmed the report as to the desirability of re-organising the Aeronautical Corps, the growth of which has reached, it appears, about the limit, as it is now constituted.

The work, however, will not be undertaken till after the war, as the Service has been eminently satisfactory as things now are.

The Minister, General Morrone, is giving his attention to assuring that the Aerial Forces shall be as independent as possible.—T. S. H.

* * *

It is reported from Rome that on Dec. 21st several Italian seaplanes bombarded military establishments at Pola and the warships anchored in the port, making good hits. All the machines returned to their base undamaged, despite the fire of anti-aircraft guns and attacks by enemy aeroplanes.

BULGARIA.

OFFICIAL COMMUNIQUÉS.

DEC. 28th.—In the valley of the Vardar there was ineffective aeroplane activity by the enemy.

DEC. 30th.—MACEDONIAN FRONT.—In the region of Monastir there has been lively aerial activity. An enemy aeroplane was brought down east of Monastir. On the Struma there has been ineffective activity by enemy aeroplanes.

TURKEY.

OFFICIAL COMMUNIQUÉ.

DEC. 21st.—ON THE TIGRIS FRONT.—One of our aeroplanes forced an enemy aeroplane to come down near the enemy's own lines.

The Future of the Royal Naval Air Service.

BY "BERKELEY."

Another year in the history of the world has passed by, and a period of good resolutions replaces for a time the days of unfulfilled promise. The European dispute continues with unabated fury, and the nations have at last begun to regard the war with due propriety. The wranglings of petty business have for a time given place to the cleanly cult of the sword, and intellect and honour are again given recognition in Europe.

At the beginning of the year, public opinion gave support for the first time to those who for several years past had demanded an adequate aeronautical programme from the naval and military advisers of the Government. As a first step in aerial progress, a request was made for a reform in the organisation of both wings of the Royal Flying Corps. By a clever political move, worthy of Talleyrand, the agitation was read into an attack on the Royal Flying Corps (Military Wing), which needed some improvement, and the Royal Naval Air Service, which required entire reconstruction, was left unscathed.

This Service, whose part in the war has been insignificant when one considers the vast sums spent on its maintenance, has on several recent occasions promised reform, and yet to-day, at the beginning of a new year, there is no essential change in the manner of its administration and operations from that which obtained at the beginning of 1915.

In some ways it is further to-day from its proper sphere of duty than it was at the outbreak of war. Then, at least, it was in some degree an integral part of the Navy. To-day, in name and in administration it is a unit of the Sea Service, while in action it is linked definitely to no part of the nation's armed forces. Last year saw the reformation of the Royal Flying Corps (Military Wing); perhaps this year may bring with it a clearer plan and a brighter future for the Royal Naval Air Service.

THE DUTIES OF THE ROYAL NAVAL AIR SERVICE.

The proper duties can be divided roughly into three sections, which cover broadly the entire sphere of activity of the Naval Flying Service. These are :—

(1) Reconnaissance with the fleet at sea.
(2) Patrol work along the coast at home and in the colonies and dependencies.
(3) Raids over enemy territory in connection with fleet action.

The first of these series of duties is the most important. The use of Zeppelins has given the German Navy a signal advantage over our fleet in the matter of reconnaissance. For a space, at least, our sea fleets were blind, and each move made was in the full knowledge of the adversary before many hours had passed. The Zeppelin gave to the German a high strategic advantage which he did not fail to use on several occasions.

It would appear from inspired statements in the Press that in this matter the conditions are now more nearly equal between the two fleets.

The airship is superior to existing types of aeroplane in its ability to remain in the air for periods up to forty-eight hours at an effective speed.

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Hence there is good reason for the development of large airships by the Navy, with the object of strategic reconnaissance continually in view. As a weapon of offence, the large airship possesses but little virtue. Recent events have clearly demonstrated the superiority of the aeroplane over the airship when the two types join battle.

SMALL AIRSHIPS.

There is possibly a future for the small airship of the S.S. type serving with the fleet at sea. Aircraft of the size of a modern Zeppelin are rather cumbrous as part of the deck furniture of a ship, but there is no reason why a small non-rigid should not be housed in a balloon ship of the type now in use. For operations on the coast of Africa or over the shores of Asia, their value would be high.

AEROPLANES ON SHIPS.

The time is not far distant when it will be possible for ships of war to carry one or two small, fast aeroplanes capable of being launched from the ship, and probably of being taken aboard again without damage. In the past, experiments have been made in flying from a specially cleared deck space, but in no case has an efficient modern aeroplane landed on the deck of a ship. As no method has yet been arranged to retain a lawnlike smoothness of surface on the ocean during flying hours, it is unlikely that the decks of ships will be used as landing grounds in the days to come. It is more likely that a special launching device, which can also be employed for taking in aeroplanes after flight, will be brought into use.

SEAPLANE-CARRIERS.

The majority of the aerial units of a fleet at sea will, it is undoubted, be carried in specially designed seaplane ships, as should be the case at present if sufficient foresight had been used in the past. The war has extended experience sufficiently to make it possible for a highly efficient ship to be laid down at the present time. Speed is essential. The fleet cannot wait while its seaplane-carriers drag slowly along, many miles behind. The equipment of such ships should be as complete as possible within the bounds of use. In the carrier would be conveyed, in addition to its own aircraft, spare parts for the aeroplanes carried in the ships of war.

There is no reason, even under present difficulties, why seaplane-carriers should not be equipped with the large, fast seaplanes of the flying-boat type, which it would appear will be the sea-going aeroplane of the future. The small scout might well be left to annoy the Commander of a cruiser.

Kite-balloons will probably continue to be part of the equipment of a fleet at sea, that gunnery practice against enemy coastal fortresses may be carried out with some degree of accuracy. They are, inexpensive, and their high value has been proved on many occasions.

COAST PATROLS.

The use of the aeroplane, in days to come, for coast patrolling is one of vast possibilities. At low expense, and with speed and regularity, an aerial patrol could be maintained along the seaboards of the British Empire. The perennial amusement of the British Navy, when peace held the world in lethargy, was a well-directed interference with slave-trading in the Persian Gulf. With an aerial patrol, these interludes in an existence of respectability would disappear.

The pirates, last of their race, who infest the river deltas of China will find their pleasures circumscribed and reduced from a profitable enterprise to one of pure sport attended by high risk when the naval seaplane polices their regions. Even wrecks will lose their high standing in the world of risk, because, again, the naval seaplane patrol may bring rapid and sure assistance.

Seaplanes for use on the coast patrol might with advantage be of the boat type, which would permit of their proceeding over sea for some distance from the coast, and of alighting in harbours at the conclusion of the patrol. The day cannot be far distant when seaplanes will be of sufficient durability and seaworthiness to remain afloat when not in use. The laborious method at present obtaining in the navies of all nations of hauling vast seaplanes into still vaster sheds after each flight, in case they should suffer from exposure to the night air or the sea-water, is surely not to remain common practice for many more months.

AIR RAIDS.

The third sphere of activity of the Royal Naval Air Service has given rise to more debate amongst those to whom flying is a part of life than any other allied subject. Our agitators ask daily for the destruction of Berlin by means of bombs dropped from aeroplanes flying the White Ensign, and piloted by aviators whose deeds of daring are to illumine the screens of the national cinematograph theatres till the sports of peace return again to give a serious turn to life.

Our authorities ever return an evasive answer, and drop bombs where the need is greater. At the present time one is told officially that British naval aviators are working in concert with the French Flying Services south of the British line in France. From time to time one reads of the distribution of death by means of bombs in towns occupied by German troops. Constantly, also, one hears that Zeebrugge and German towns on the Belgian seaboard have been visited by the British naval aeroplanes. Yet, withal, no definite policy is apparent.

NAVAL STRATEGY.

There is considerable reason for the formation and declaration of such policy. Aeroplanes are insufficient for the daily needs of the Army, and all duties, of whatever excellence, carried out on lines divergent from the calls of first necessity are wasted.

It would appear that naval aeroplanes may carry out bomb-dropping raids and reconnaissances over land, so long as they are in connection with naval strategy. The bombing of Zeebrugge, of Antwerp, of Bruges, of Wilhelmshafen, or of the Schleswig coast, are a part of naval strategy, and are consequently proper and of high value.

But raids into the interior of Germany, unless the object be to destroy naval Zeppelins, should be left to the Royal Flying Corps (Military Wing) as a part of military strategy. If the reason for the present attachment of a Naval Wing to the French Army be due to a lack of proper naval flying duties, then such personnel should be transferred to the Army. Similarly, a great number of land-going aeroplanes at present in the possession of the Navy might go to the other Service.

THE ADMINISTRATION OF THE R.N.A.S.

If, perchance, a third Air Service be formed, independent of either the Army or the Navy, the latter Service will probably still be permitted to retain a specialist flying service of its own, the duties of which will be as indicated above.

Some pressure has recently been brought to bear on the authorities in favour of the addition of an Air Lord to the Board of Admiralty. There would appear to be no valid reason for such a step, unless conditions change greatly. The principle is bad. A Submarine Lord might be placed on the Board with equal justification.

Their Lordships are appointed to deal with the Navy

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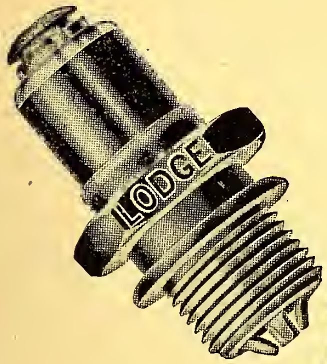

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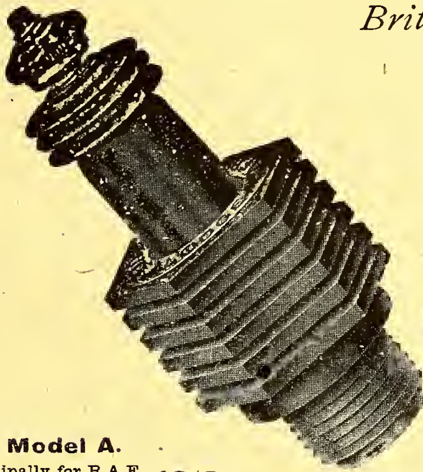

Model A.

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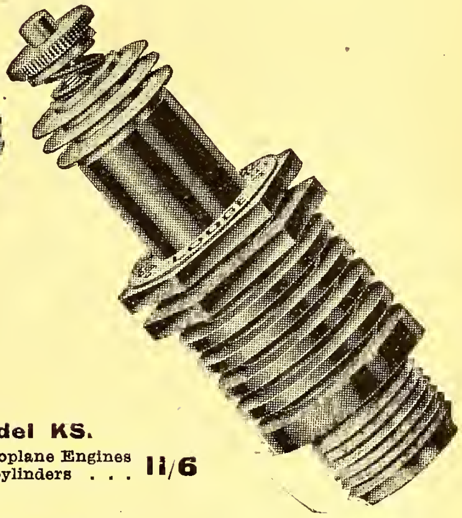

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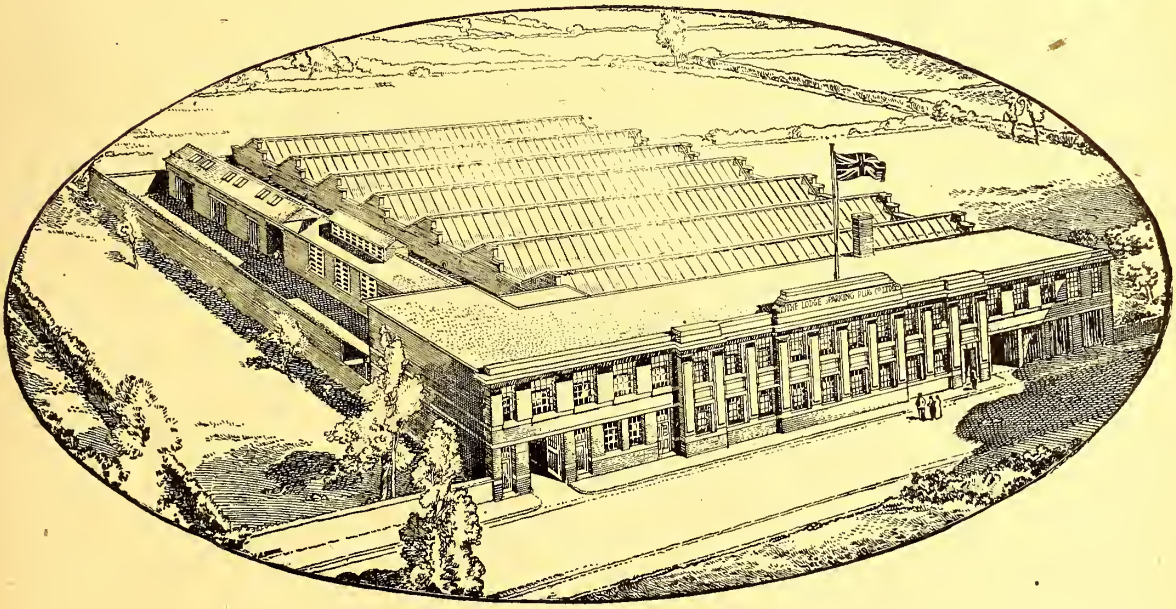
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as a whole, each having his share in the application of the general principles. Operations, administration, finance, and so on, are allotted to the office of each member, and so, as in all military services, the general efficiency is maintained. To instal a further member to deal with a branch of the service rather than with a section of the control is an insupportable innovation which is not improved by the parallel instance on the Army Council. Divergence from principles may serve for a moment. The time of regret comes later, but, nevertheless, is inevitable.

A Part of the Navy.

The more the Royal Naval Air Service is treated honestly and fairly as a part of the Navy, the higher will become its efficiency, especially if it remains under a strong director who receives adequate support from their Lordships.

During the war, the strain of providing material for the R.N.A.S. should be borne by the Ministry of Munitions, with exception, perhaps, of normal supplies which might pass with advantage through the customary channels.

The tendency of both Flying Services has been to centralise to a high degree, in contradiction of the English political principle proved by long experience of decentralisation. The British Army, which, when all allowances have been made, is one of the most efficient Services in the world, depends for its success on the division of responsibility throughout all ranks of the Service.

Place any service under one head and centralise its efforts, and efficiency may come while the head is powerful and talented, but when once that head is replaced by a lesser character chaos follows.

On the other hand, with graduated responsibility and a proper system of decentralisation, there is little variation in its manner of existence, whosoever may be in temporary charge. It is, therefore, of vital importance that the aircraft organisation may merge into the Admiralty until the aeroplane or airship is designed, manufactured, manned, and operated, as is the submarine to-day.

The Aeronautical Society and the S.B.A.C.

An agreement which will be welcomed by all who have the future of aeronautics at heart, and which is likely to have far-reaching effects upon the development of aeronautics, has lately been entered into between the Society of British Aircraft Constructors and the Aeronautical Society of Great Britain as the result of conferences between the two bodies.

The main objects of the agreement are to provide for the co-operation and mutual support of the two bodies in their respective spheres, to develop and co-ordinate aeronautical research, and generally to link up the scientific and industrial aspects of aeronautics.

Under the agreement in question, the Aeronautical Society of Great Britain is recognised as the paramount and representative body of the scientific and technological aspects of aeronautics, while the Society of British Aircraft Constructors is recognised as the paramount and representative body of the British Aircraft Industry. Aircraft engines are, of course, covered by these provisions.

A Joint Committee.

Arrangements have been made for the setting up of a Standing Committee consisting of equal numbers of the members of the Council of the Aeronautical Society and of the members of the Committee of Management of the Society of British Aircraft Constructors. This Standing Committee will have power to invite representatives of Government Departments and other bodies to assist in its deliberations.

An important function of the Standing Committee will be to act as the channel of communication by which the governing bodies of the Societies are to be kept in touch. It will advise the governing bodies upon matters affecting their common interests, will consider questions of policy, and will recommend to the respective governing bodies whether joint action is or is not desirable on any matter coming within the scope of the Standing Committee.

It is laid down that all questions relating to scientific and technological research arising from the mutual action of the two Societies shall be dealt with by the Aeronautical Society, and similarly all industrial questions shall be dealt with by the Society of British Aircraft Constructors.

Technical Committees.

A very important provision deals with the setting up of Technical Committees for special purposes. These are to be established by the Aeronautical Society on the recommendation of the Standing Committee, and will in all cases be composed of an equal number of representatives of each Society. Like the Standing Committee, these Special Committees will have power to invite the assistance of representatives of other bodies and of Government Departments.

It will be seen that the foregoing arrangements provide for a Standing Committee to consider questions of policy generally, while the Technical Committees will investigate particular problems, concentrating upon them the special expert knowledge of all the interests concerned.

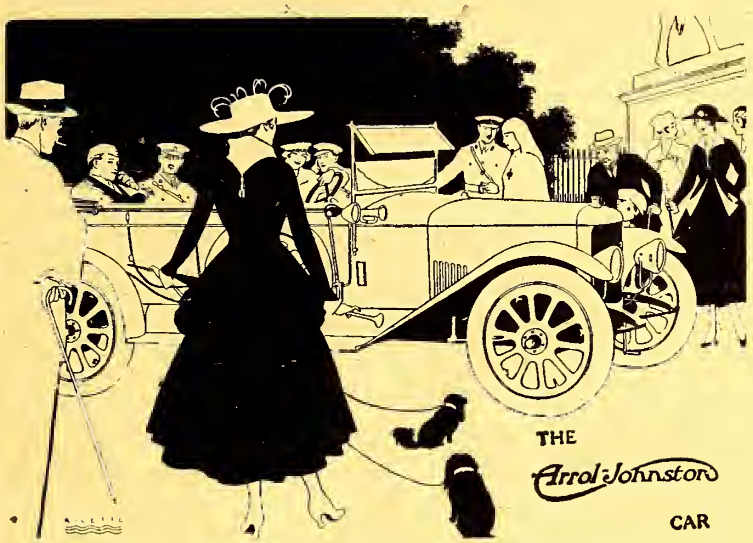
Government Interests.

The Government proposals for the development of scientific and industrial research will have an important bearing upon the working out of the above arrangement. A Committee of the Privy Council was set up some time since to develop and link up scientific and industrial research, and has since become a special Department under the Lord President of the Privy Council, with the President of the Board of Education as Vice-President. A large sum of money is to be placed by the Government at the disposal of the new Department, to be used for the assistance, on a co-operative basis, of research for the benefit of national industries.

It will be seen that the arrangement to which the Aeronautical Society and the Society of British Aircraft Constructors have come entirely agrees in principle with the purpose of the new Government Department, and industrial and scientific research in aeronautics cannot fail to be substantially advanced thereby.

One naturally wishes these two important bodies every success in their working agreement, and congratulates them on their wisdom. The rejuvenation of the Aeronautical Society is thereby assured, and with its return to vigour one hopes to see a publicity campaign which will impress the minds of those who are just beginning to take an interest in aeronautics that the Aeronautical Society is the only scientific aeronautical institution which is recognised by those actively concerned with aeronautics, and so confusion with any proprietary concern of similar title may be avoided.

It is hoped that the Committee of the Royal Aero Club will now bestir itself to the point of making a working agreement with the Aeronautical Society and the S.B.A.C., to the advantage of all three institutions, for their mutual protection against interlopers and against possible official errors in the future.



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The R.N.A.S. Honours List for 1916.

[Below is given a list of honours, awards, and special promotions won by the R.N.A.S. and officers attached thereto and immediately concerned therewith; and notified during 1916.

Awards dated Dec. 31st, 1915, are included because they appeared after the last annual list of R.N.A.S. honours was printed. —Ed.]

The Victoria Cross.

Dec. 31st, 1915.

Squadron-Commander Richard Bell Davies, D.S.O., R.N.

The following citation was published:—

The King has been graciously pleased to approve of the grant of the Victoria Cross to Squadron-Commander Richard Bell Davies, D.S.O., R.N., and of the Distinguished Service Cross to Flight Sub-Lieutenant Gilbert Formby Smylie, R.N., in recognition of their behaviour in the following circumstances:—

On November 19th these two officers carried out an air attack on Ferrijik Junction. Flight Sub-Lieutenant Smylie's machine was received by very heavy fire and brought down. The pilot planed down over the station, releasing all his bombs except one, which failed to drop, simultaneously at the station from a very low altitude. Thence he continued his descent into the marsh. On alighting he saw the one unexploded bomb, and set fire to his machine, knowing that the bomb would ensure its destruction. He then proceeded towards Turkish territory. At this moment he perceived Squadron-Commander Davies descending, and fearing that he would come down near the burning machine and thus risk destruction from the bomb, Flight Sub-Lieutenant Smylie ran back and from a short distance exploded the bomb by means of a pistol bullet. Squadron-Commander Davies descended at a safe distance from the burning machine, took up Sub-Lieutenant Smylie, in spite of the near approach of a party of the enemy, and returned to the aerodrome, a feat of airmanship that can seldom have been equalled for skill and gallantry.

* * *

The Most Honourable Order of the Bath.

December 31st, 1915.

To be Knight Commander.

Vice-Admiral Reginald Hugh Spencer Bacon, C.V.O., D.S.O. Retired (Admiral of Patrols).

Dec. 31st, 1916 ("Gazette" of Jan. 1st, 1917.)

The King has been graciously pleased to give orders for the following appointment to the Most Honourable Order of the Bath:

C.B.

Rear-Admiral Charles Lionel Vaughan-Lee.

* * *

The Most Distinguished Order of St. Michael and St. George.

March 14th, 1916.

Third Class, or Companion.—Wing Captain Frederick Hugh Sykes, R.N.A.S.

* * *

The Royal Victorian Order.

August 18th, 1916.

Promotion to Commander.—Vice-Admiral Sir Reginald Hugh Spencer Bacon, K.C.B., C.V.O., D.S.O.

* * *

The Distinguished Service Order.

To be Companions of the Distinguished Service Order.

Dec. 31st, 1915.

Flight Sub-Lieutenant James Brian Patrick Ferrand, R.N.

On November 28th, 1915, accompanied by First Class Air Mechanic Oldfield as gunner, Flight Sub-Lieutenant Ferrand attacked a hostile seaplane, which was accompanied by three more seaplanes and a destroyer, off the Belgian coast, and brought it down by gunfire into the water, where it immediately sank. He then attacked the destroyer, and only abandoned the attack after coming under heavy shell fire both from the destroyer and the shore batteries of Westende.

Flight Sub-Lieutenant Taunton Elliott Viney, R.N.

For his services on November 28th, 1915, when, accompanied by le Lieutenant en second de Sincay as observer, he destroyed a German submarine off the Belgian coast by bombs dropped from an aeroplane.

Le Lieutenant en second Colley Saint-Paul Comte de Sinçay, attached to No. 1 Wing, R.N.A.S.

To be an Honorary Companion of the Distinguished Service Order.—For his services in connection with the destruction of a German submarine by bombs dropped from an aeroplane on November 28th, 1915.

April 7th, 1916.

Lieut. Reginald John Bone, R.N., Flight Commander, R.N.A.S.

In recognition of his services on March 19th, 1916, when, flying a land machine and unaccompanied by an observer, he chased out to sea, and after bold and skilful manœuvring, disabled and brought down by gunfire a German seaplane, which had been engaged in a raid on the coast of Kent.

May 31st, 1916.

Lieut.Commander A. D. Borton, R.N.V.R.

In recognition of most valuable services in command of a detachment of R.M. machine guns in difficult and dangerous parts of the line in Gallipoli Peninsula.

[Lieut.-Commander Borton was formerly an R.F.C. officer, and was invalided out with a broken neck, caused in an aeroplane accident. He later joined the R.N.V.R.—Ed.]

June 22nd, 1916.

Commander Robert Marsland Groves, R.N. (Wing Commander, R.N.A.S).

In recognition of his services in command of a Wing of the Royal Naval Air Service at Dunkirk. Commander Groves has by his personal skill as a pilot, and also by his untiring zeal, effected a marked advancement in the general standards of flying on active service. He has on several occasions carried out successful reconnaissances to Ostend under fire, and by his own example has proved the utility and great importance of night flying.

Captain and Brevet Major Eugene Louis Gerrard (temporary Lieut.-Col.), R.M. (Wing Commander, R.N.A.S.).

In recognition of his services in command of a Wing of the R.N.A.S. in the Eastern Mediterranean. The present efficiency of this Wing is due very largely to Wing Commander Gerrard, whose personal example and the manner in which he has encouraged the younger officers under his command are all that can be desired.

Lieutenant Douglas Austin Oliver, R.N. (Squadron Commander, R.N.A.S.).

In recognition of his services on the morning of April 25th, 1916, when he pursued out to sea the enemy fleet which had bombarded Yarmouth, and flew along the line dropping bombs, being subjected to intense anti-aircraft fire.

Flight Lieutenant Kenneth Stevens Savory, R.N.A.S.

Flight Sub-Lieutenant Richard Sebastian Willoughby Dickinson, R.N.A.S.

In recognition of their services on the night of April 14th-15th, 1916, when they carried out a flight to Constantinople, and dropped bombs upon points of military importance, returning safely to their base after a long flight in rough and stormy weather.

Flight Lieutenant (Acting Flight Commander) Redford Henry Mulock, R.N.A.S.

In recognition of his services as a pilot at Dunkirk. This officer has been constantly employed at Dunkirk since July, 1915, and has displayed indefatigable zeal and energy. He has on several occasions engaged hostile aeroplanes and seaplanes, and attacked submarines, and has carried out attacks on enemy air stations, and made long-distance reconnaissances.

Lieutenant John Henry Dalbiac, R.M.A.

In recognition of his services as an aeroplane observer at Dunkirk since February, 1915. During the past year Lieut. Dalbiac has been continually employed in coastal reconnaissances and fighting patrols. The Vice-Admiral Commanding the Dover Patrol, in reporting on the work of the R.N.A.S. at Dunkirk, lays particular emphasis on the good work done by the observers.

October 25th, 1916.

Flight Lieutenant Colin Roy Mackenzie, R.N.A.S.

In recognition of his skill and gallantry in destroying a German kite balloon on September 7th, 1916, under very severe anti-aircraft fire.

December 5th, 1916.

Flight Sub-Lieutenant Edward Laston Pulling, R.N.A.S.

In recognition of the skill and gallantry which he displayed on the morning of November 28th, 1916, in pursuing out to sea, attacking at close range, and destroying a Zeppelin, which had been engaged in a raid on England. Flight Sub-Lieutenant Pulling was exposed to machine-gun fire throughout the attack.

* * *

The D.S.O. and the Distinguished Service Cross.

September 15th, 1916.

The King has been graciously pleased to give orders for the following appointment to the Distinguished Service Order and for the award of the Distinguished Service Cross to the undermentioned officer in recognition of his services as mentioned in the dispatch on the Battle of Jutland:—

Flight Lieutenant Frederick Joseph Rutland, R.N. (Lieut. R.N.).

For his gallantry and persistence in flying within close range of four enemy light cruisers, in order to enable accurate information to be obtained and transmitted concerning them. Conditions at the time made low flying necessary.

* * *

The Distinguished Service Cross.

December 31st, 1915.

Flight Sub-Lieutenant Gilbert Formby Smylie, R.N.

January 21st, 1916.

Flight Lieutenant Vivian Gaskell Blackburn, R.N.

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March 14th, 1916.

Flight Commander Charles Henry Butler, R.N.A.S.
Flight Lieutenant Gordon Lindsay Thomson, R.N.A.S.
Flight Lieutenant Edward Harris Dunning, R.N.A.S.
Lieutenant L. H. Strain, R.N.V.R.
Lieutenant William Park, R.N.V.R.
Acting Sub-Lieutenant John Edmund Sissmore, R.N.
Acting Sub-Lieutenant John Dyson Chapple, R.N.
Midshipman Erskine Knollys Heveningham St. Aubyn, R.N.

May 31st, 1916.

Flight Sub-Lieutenant Henry Karslake Thorold, R.N.A.S.
Sub-Lieutenant Reginald Henry Portal, R.N.

June 22nd, 1916.

Flight Commander (Acting Squadron Commander) Francis Knox Haskins, R.N.
Lieutenant Douglas Claude Strathern Evill, R.N., Flight Commander, R.N.A.S.
Flight Lieutenant John Joseph Petre, R.N.A.S.
Flight Lieutenant Vincent Nicholl, R.N.A.S.
Flight Lieutenant Frederick George Darby Hards, R.N.A.S.
Flight Lieutenant Charles Henry Chichester Smith, R.N.A.S.
Flight Lieutenant (Acting Flight Commander) George Henry Beard, R.N.A.S.
Flight Sub-Lieutenant Herbert Glynn Hall, R.N.A.S.
Lieutenant Charles William Nutting, R.N.V.R.
Lieutenant Edward Raymond Peal, R.N.V.R.
Sub-Lieutenant Horace William Furnival, R.N.R.
Temporary Lieutenant Gerald Fenwick Haszard, R.N.

September 6th, 1916.

Flight Sub-Lieutenant Roderic Stanley Dallas, R.N.A.S.
Sub-Lieutenant (now Acting Lieutenant) Christopher Bernard Oxley, R.N.
Flight Sub-Lieutenant Donald Ernest Harkness, R.N.A.S.
Flight Sub-Lieutenant Ralph Harold Collet, R.N.A.S.

October 25th, 1916.

Flight Commander Tom Harry England, R.N.A.S.
Flight Lieutenant Charles Teverill Freeman, R.N.A.S.
Flight Sub-Lieutenant Stanley James Goble, R.N.A.S.
Flight Sub-Lieutenant Ronald Grahame, R.N.A.S.
Flight Sub-Lieutenant Daniel Murray Boyne Galbraith, R.N.A.S.

December 5th, 1916.

Flight Lieutenant Egbert Cadbury, R.N.A.S.
Flight Sub-Lieutenant Gerrard William Reginald Fane, R.N.A.S.

Dec. 31st, 1916 ("Gazette" of Jan. 1st, 1917.)

Flight Lieut. Ernest William Norton, R.N.A.S.

* * *

The Distinguished Service Medal.

May 15th, 1916.

Chief Petty Officer Mechanic Bernard John William Brady, O.N., 234186, R.N.A.S.

* * *

The Albert Medal 1st Class.

August 11th, 1916.

Lieutenant Frederick Joseph Rutland, R.N. (Flight Lieutenant, R.N.A.S.).

* * *

The Albert Medal 2nd Class.

January 14th, 1916.

Chief Petty Officer Michael Sullivan Keogh.

FOREIGN ORDERS.

The Legion of Honour.

March 21st, 1916.

The King has been pleased to give and grant unto the under-mentioned officers His Majesty's Royal licence and authority to wear the decoration which has been conferred upon them by the President of the French Republic in recognition of valuable services rendered by them.

Chevalier of the Legion of Honour.

Engineer Lieutenant-Commander Charles Russell Jekyl Randall, R.N. (Wing Commander in R.N.A.S.).
Flight Commander (Acting Squadron Commander) Harry Delacombe, R.N.A.S.

September 15th, 1916.

The President of the French Republic has bestowed the decoration of the Legion of Honour, with the approval of His Majesty the King, on the under-mentioned officer, in recognition of his services during the war:—

Croix de Chevalier.

Lieutenant Lancelot Tomkinson, R.N. (Flight Commander).

May 2nd, 1916.

The King has been pleased to give and grant unto the under-mentioned Naval officer His Majesty's Royal licence and authority to wear the decoration which has been conferred upon him by the President of the French Republic in recognition of valuable services rendered by him:—

Insignia of Chevalier of the Legion of Honour.

Lieutenant-Commander Arthur Murray Longmore, R.N., until recently holding the appointment of Wing Commander in the R.N.A.S.

May 19th, 1916.

The King has granted to the following officers authority to wear the decorations which have been conferred upon them by the President of the French Republic in recognition of valuable services rendered by them:—

Insignia of Chevalier of the Legion of Honour.

Engineer Lieut-Commander Edward Featherstone Briggs, D.S.O., R.N. (Squadron-Commander, R.N.A.S.).
Lieutenant John Tremayne Babington, D.S.O., R.N. (Squadron-Commander, R.N.A.S.).
Flight-Commander Sidney Vincent Sippe, D.S.O., R.N.A.S.

* * *

The Order of Leopold.

November 10th, 1916.

The King has been pleased to give and grant unto Vice-Admiral Sir Reginald Hugh Spencer Bacon, K.C.B., K.C.V.O., D.S.O., His Majesty's Royal licence and authority to wear the Insignia of Grand Officer of the Order of Leopold, which Decoration has been conferred upon him by His Majesty the King of the Belgians in recognition of valuable services rendered by him.

Dec. 31st, 1916 ("Gazette" of Jan. 1st, 1917.)

The King of the Belgians has bestowed a decoration, with the approval of His Majesty the King, on the following Officer, in recognition of his services during the war:—

Ordre de Leopold.

Officer.—Comdr. Henry Crosby Halahan, D.S.O., R.N.

* * *

The Order of the Nile.

December 4th, 1916.

The King has been pleased to give and grant unto the under-mentioned Naval Officer His Majesty's Royal licence and authority to wear the decoration which has been conferred upon him by His Highness the Sultan of Egypt in recognition of valuable services rendered by him:—

Fourth Class of the Order of the Nile:—Squadron-Commander Cecil John L'Estrange Malone, R.N.

SPECIAL PROMOTIONS.

Dec. 31st, 1915.

Lieutenant-Commander to Commander:—Robert Hamilton Clark-Hall (now Acting Commander).

Squadron Commanders to Wing Commanders:—Robert Gordon, Robert Hamilton Clark-Hall, Charles Russell Jekyl Randall, Richard Bell Davies, D.S.O. Dated Jan. 1st, 1916.

Flight Commanders to Squadron Commanders:—Frederick William Bowhill, Arthur Bruce Gaskell, Ennis Tristram Ratcliffe Chambers (now Acting Squadron Commander), Cecil Francis Kilner, D.S.O.

Edmund Digby Maxwell Robertson, Reginald Lennox George Marix, D.S.O., Francis Kennedy McClean (for temporary service) (now Acting Squadron Commander), John Tulloch Cull, D.S.O. (now Acting Squadron Commander). Dated Jan. 1st, 1916.

Flight Lieutenants to Flight Commanders:—John Marten Rush Cripps, Thomas W. Elsdon, Herbert Stanley-Adams (now Acting Flight Commander), George Miller Dyott (for temporary service) (now Acting Flight Commander).

Robert Hilton Jones, Cuthbert Morgan Murphy (now Acting Flight Commander), Douglas Claude Strathern Evill (now Acting Flight Commander), John Philip Wilson, D.S.C. (now Acting Flight Commander).

James Douglas Maude, Ernest Victor Samuel Wilberforce, John Dunville (for temporary service), Charles Frederick Pollock (for temporary service). Dated Jan. 1st, 1916.

Flight Sub-Lieutenants to Flight Lieutenants:—Charles George Vernier, Benjamin Travers, John Conrad Peter Wood, Arthur Charles Teesdale.

Eustace Fletcher Moyes, Arthur Quilton Cooper (for temporary service) (Acting Flight Lieutenant), Frederick Whittington Gamwell (now Acting Flight Lieutenant), Robert Dymond Gladman Sibley.

Lawrence Pratt Openshaw, Cuthbert Everard Brisley (for temporary service), William Geoffrey Moore, George Hancock Reid.

Thomas Vaughan Lister, Thomas Francis Netterville Gerrard, Oswald Noel Walmesley, James Edward Baker Maclean.

John Daniel Newberry, Thomas Hinsheiwood, Frank Thomas Digby, Bertram Denison Kilner.

Ralph Squire Sorley, John Thearsby Bankes-Price (for temporary service), Frank Besson, Charles William Fairfax Morgan.

Robert Hudson Routledge, Christopher Eric Wood, Eustace de Courcy Hallifax, Colin Johnson.

Dudley Ware Alexander Barton, James Brian Patrick Ferrand, John Stanley Fleming Morrison, Richard Cecil Hardstaff.

Frederick William Lucas, Leslie Hewitt Hardstaff, Royce Gustave André Baudry, Arthur Frederick Foy Jacob.

Guy William Cranfield (for temporary service), William Charles Michie (for temporary service), Gilbert Formby Smylie, Frank Fowler.

Charles Walter Graham (for temporary service), Alexander Robb Cox, Colin Temple MacLaren, Cecil Dougles Morrison.

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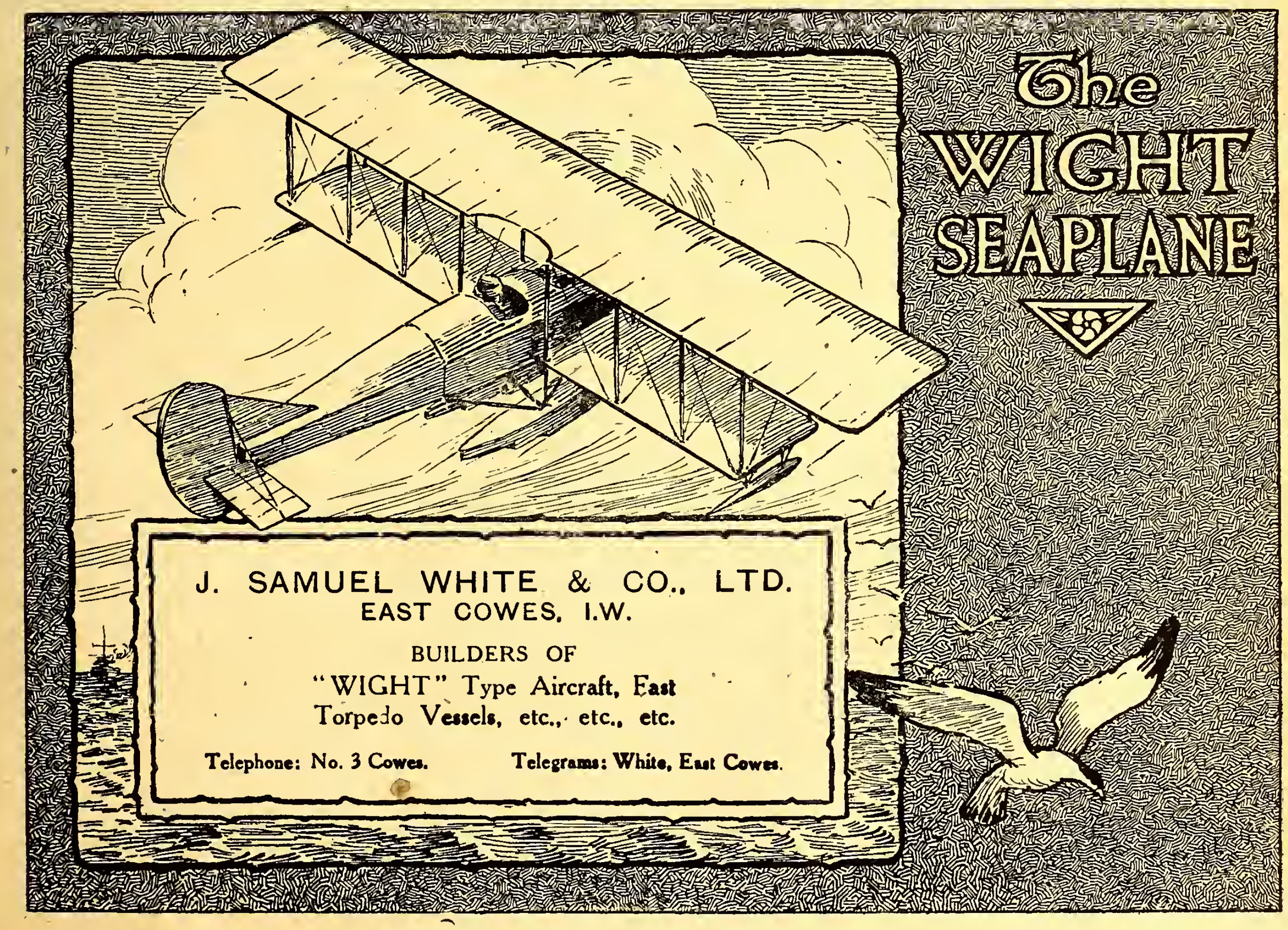

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John Robert Davison (for temporary service), Edward Stewart Cripps (for temporary service), Arthur Hamilton Chandler (for temporary service), Taunton Elliott Viney, Ernest Arthur Oliphant Auldjo-Jamieson. Dated Jan. 1st, 1916.

July 28th, 1916.

The following promotions have been made: Wing Commrs. to be Wing Capts.:—E. A. D. Masterman, E. M. Maitland, E. L. Gerrard, C. L. Lambe.

Squadron Commrs. to be Wing Commrs.:—C. M. Waterlow, J. W. Seddon, J. C. Porte.

Flight Commrs. to be Squadn. Commrs:—D. H. Hyde-Thomson, A. J. Miley, W. C. Hicks, E. Osmond, I. H. W. S. Dalrymple-Clark (Act. Squadn. Commr.), R. J. Bone, D.S.O., C. H. K. Edmonds, D.S.O., I. G. V. Gowler, H. M. Cave-Brown-Cave, A. D. Cunningham, R. E. C. Peirse, D.S.O., J. R. W. Smyth-Pigott, D.S.O., (Act. Squadn. Commr.), P. F. M. Fellowes.

Flight Lts. to be Flight Commrs.:—E. B. Beauman, N. B. Tomlinson, C. W. H. Pulford, P. L. Holmes, E. R. Whitehouse, H. Stewart, A. R. Arnold, N. S. Douglas, G. B. Dacre, D.S.O., R. J. J. Hope-Vere (Act. Flight Commr.), R. Whiteehad, V. G. Blackburn, D.S.C., G. L. Thomson, D.S.C., I. H. B. Hartford, G. C. Colmore (Act. Flight Commr.), A. K. Robertson (temp. serv.), B. F. Fowler (temp. serv.), D. Harries, G. H. Scott, R. E. Nicoll, K. S. Savory, D.S.O., T. H. England, V. Nicholl, D.S.C., B. L. Huskisson, J. J. Petre, E. H. Dunning, D.S.C., H. F. Towler.

Flight Sub-Lts. to be Flight Lts.:—F. J. Bailey, L. H. F. Irving, R. G. Mack, W. F. Horner, A. W. Mylne, R. A. Cochrane, R. S. Booth, G. M. Thomas, C. J. Galpin, J. G. Struthers (temp. serv.), R. S. Smith, E. A. de L. de Ville (temp. serv.), G. A. Cox, S. St. G. C. Belfield (temp. serv.), C. L. Scott, E. J. P. Burling, H. C. Vereker, J. B. Cole-Hamilton, E. P. Hardman (temp. serv.), S. R. Watkins (temp. serv.), J. A. Goodwin, G. G. G. Hodge, C. F. Latimer, S. B. Joyce, C. R. Blagrove temp. serv.), G. G. Ommanney, H. de V. Leigh, H. S. Bompas (temp. serv.), L. C. Keeble, H. A. Bower, J. D. Hume (temp. serv.), P. Roach-Pierson, V. Nicholson (temp. serv.) (since killed), N. W. G. Blackburn (temp. serv.), C. C. Wyllie (temp. serv.), H. K. Thorold, D.S.C., H. S. Nevill (temp. serv.) E. W. Norton, E. Cadbury, J. H. D. Grant (temp. serv.), M. H. Spencer (temp. serv.), E. M. Pizey (temp. serv.), S. Bell (temp. serv.), B. C. Clayton, J. E. Minifie (temp. serv.), R. S. Dallas (temp. serv.), A. D. W. Allen (temp. serv.), C. R. Mackenzie (temp. serv.), F. U. Y. Weldon (temp. serv.), C. Mac Laurin (temp. serv.), C. T. Freeman (temp. serv.), J. A. Carr (temp. serv.), C. B. Gasson (temp. serv.), P. A. Johnston (temp. serv.), A. T. N. Cowley (temp. serv.), G. V. Leather (temp. serv.), C. H. Hayward (temp .serv.), J. H. Vickers (temp. serv.), B. C. Tooke (June 30th).

Sept. 18th, 1916.

Temporary Flight Sub-Lieutenant R. H. Collet, D.S.C., has been specially promoted to temporary Flight Lieutenant for good service, Sept. 19ts.

Dec. 31st, 1916 ("Gazette" of Jan. 1st, 1917.)

The following promotion has been mode in the Royal Navy:—

Commander to be Captain

Charles L. Lambe (now Acting Captain).

Promotions in the Royal Naval Air Service.

Squadron Commanders to be Wing Commanders.

Spenser D. A. Grey, D.S.O.
Cecil J. L'Estrange-Malone.
Ivor T. Courtney (now Acting Wing Comdr.)
Charles E. Risk.
Christopher L. Courtney.
Charles E. H. Rathborne.
John N. Fletcher.
Thomas R. Cave-Browne-Cave.
John D. Mackworth.
Arthur W. Bigsworth, D S.O
Robert P. Ross.
Ennis T. R. Chambers (now Acting Wing Comdr.).

Squad. Comdr. for Temp. Service to be Acting Wing Comdr.

Alexander Ogilvie.

Flight Commanders to be Squadron Commanders.

Christopher E. Maude.
John H. Lidderdale.
Charles D. Breese (now Acting Sq. Comdr.).
Eric R. C. Nanson (now Acting Sq. Comdr.).
Evelyn H. Sparling (now Acting Sq. Comdr.).
James W. O. Dalgleish.
Geoffrey R. Bromet (now Acting Sq. Comdr.).
Lancelot Tomkinson.
Harry Delacombe (now Acting Sq. Comdr.) (for temporary service).
Edward T. Newton-Clare.
Archibald Corbett-Wilson.
Henry R. Busteed (now Acting Sq. Comdr.).
John W. K. Allsop (for temporary service).
Charles H. Butler, D.S.C. (for temporary service).
Francis K. Haskins, D.S.C. (now Acting Sq. Comdr.).
Herbert Stanley-Adams.
Robert H. Jones.
Cuthbert M. Murphy (now Acting Sq. Comdr.).
Douglas C. S. Evill, D.S.C.
John P. Wilson, D.S.C.
The Master of Sempill (for temporary service).
Vivian Gaskell Blackburn, D.S.C.

Flight Lieuts. to be Flight Commanders.

Harold A. Buss (temp. Serv.). Frank A. Brock. Basil Binyon (Actg. Flt. Cdr., temp. serv.). Alfred W. Clemson. The Hon. Gilbert de St. C. Rollo (temp. serv.). Edwin R. Moon (temp. serv.). Marmaduke S. Marsden. Douglas Iron. Aylmer F. Bettington, Maurice E. A. Wright.

Rupert E. Penny. Frederick J. Rutland, D.S.C. Alister P. Mackilligin (temp. serv.). Edward J. C. Roberts. John S. Mills, D.S.C. (Actg. Flt. Cdr.). Peter Legh. Eric J. Hodsoll (Actg. Flt. Cdr.). Archibald S. Maskell. Brian S. Benning. Stanley E. Ritchie.

Charles H. C. Smith, D.S.C. Roger M. Field. George F. Breese (Actg. Flt. Cdr.). John C. Brooke. William L. Welsh. Ivor Fraser (temp. serv.). Thomas A. Batchelor. Benjamin Travers (Actg. Flt. Cdr.). James C. P. Wood.

Theodore D. Hallam, D.S.C. (temp. serv.).

Eustace F. Moyes. Arthur Q. Cooper (temp. serv.). Frederick W. Gamwell. Robert D. G. Sibley. Lawrence P. Openshaw. Cuthbert E. Brisley (temp. serv.). William G. Moore. Thomas V. Lister. Thomas F. N. Gerrard (Actg. Flt. Cdr.). James E. B. Maclean.

Thomas Hinshelwood. Bertram D. Kilner. Eustace de C. Halifax. Redford H. Mulock, D.S.O. (Actg. Flt. Cdr.).

Frederick W. Lucas. Guy W. Cranfield (temp. serv.). William C. Michie (temp. serv.). Reginald B. B. Colmore (Actg. Flt. Cdr.). Roderic S. Dallas, D.S.C. (temp. serv.). Colin R. Mackenzie, D.S.O. (temp. serv.).

Flight Sub-Lieuts. to be Flight Lieuts.

William Tesh. Charles H. W. Godfrey. Herbert Hall. John A. Barron. Leslie E. R. Murray. John F. Roche. John E. M. Pritchard (for temp. serv.). Arnold H. Sandwell (for temp. serv.). Walter B. Lawson (for temp. serv.). John E. Morgan.

Edward A. Pearson (for temp. serv.). Lancelot G. Sieveking. Thomas F. Morris (Act. Flt. Lt) (temp. serv.). James Wann (for temp. serv.). Lewis Morgan. Arthur N. Gallehawk (now Act. Flt. Lt) (for temp. serv.). Henry G. R. Malet. Francis E. P. Barrington. Wilfrid Perham. Stanley Kemball (for temp. serv.).

Norman E. Stirling (for temp. serv.). William P. D. C. Scott (for temp. serv.). Henry D. Hyde (for temp. serv.). Frederic W. Walker (for temp. serv.). John B. Cussen (for temp serv.) Charles A. Maitland-Heriot (for temp. serv.). Howard V. Reid (for temp. serv.). Alfred M. Blake (for temp. serv.). Guy E. Williamson (temp. serv.). Lionel C. Shoppee (temp. serv.).

Arthur T. Moore (for temp. serv.). Richard F. E. Wickham (for temp. serv.). Hugh R. C. Dewes (for temp. serv.). William Man (for temp. serv.). Reginald A. W. Adkins (for temp. serv.). Harry G. Ford (for temp. serv.) Philip Laing (for temp. serv.). Richard E. Bush (for temp. serv.). Harold L'E. Tyndale-Biscoe (now Act. Flt. Lt.) (for temp. serv.). Walter T. S. Williams (for temp. serv.).

John A. Sadler (for temp. serv.). Alfred Gammon (for temp. serv.). Willoughby A. Davies (for temp. serv.). Richard S. W. Dickinson, D.S.O. (for temp. serv.). Harry Sherwood (for temp. serv.). Kenneth C. Buss (now Act. Flt. Lt.) (for temp. serv.). Frederick R. Sadd (now Act. Flt. Lt.) (for temp. serv.). Norman G. Stewart-Dawson (for temp. serv.). William S. Wilson (for temp. serv.). Graham Smethurst (for temp. serv.).

Fabian P. Reeves (for temp. service). Warner H. Peberdy (for temp. service). Frederick D. Till (for temp. service). Gerrard W. R. Fane (for temp. service). Thomas F. Le Mesurier (for temp. service). Hugh A. Peck (now Act. Flt. Lt.) (for temp. service). Ernest L. Ford (for temp. service). Rudolf D. Delamere (for temp. service). William G. McMinnies (now Act. Flt. Lt.) (for temp. service) Leonard G. Scott (now Act. Flt. Lt.) (for temp. service). Irwin N. C. Clarke (for temp. service). Herbert L. Wood (for temp. service). Arthur B. Watkins (now Act. Flt. Lt.) (for temp. service). Eric L. Pralle (now Act. Flt. Lt.) (for temp. service). Henry G. Holden (for temp. service). Ivan de Burgh Daly (for temp. service). Frederick C. C. Calder (for temp. service). Miles J. G. Day (for temp. service).

Edward L. Pulling, D.S.O. (for temp. service). Eric T. Bradley (for temp. service). Robert J. O. Compston (for temp. service). Harwood J. Arnold, D.S.O. (for temp. service). George R. S. Fleming (for temp. service). Cecil H. Darley (for temp. service). Ernest Potter (for temp. service). Ronald Grahame, D.S.C. (for temp. service). William E. Gardner (for temp. service). Allan S. Todd (for temp. service).

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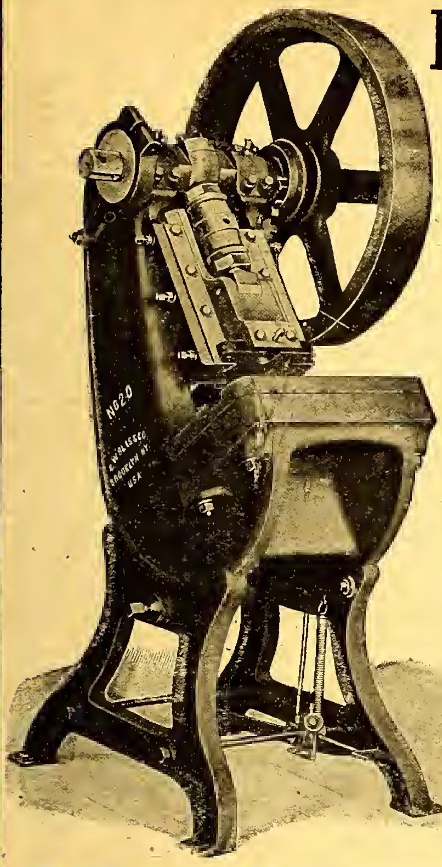

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MENTIONED IN DISPATCHES.

January 12th, 1916.

From the dispatch from Vice-Admiral Reginald H. S. Bacon, K.C.B., C.V.O., D.S.O., commanding the Dover Patrol, reporting the operations off the Belgian coast between August 22nd and November 19th, 1915:—

"Throughout these operations attacks have been made on our vessels by the enemy's aircraft, but latterly the vigilance of our Dunkirk Aerodrome, under Wing-Commander A. M. Longmore, has considerably curtailed their activity."

The following officer is commended for service in action:—
Flight-Commander Francis Knox Haskins, R.N.

March 14th, 1916.

From dispatches from the Vice-Admiral Commanding the Eastern Mediterranean Squadron covering operations between the time of the landing on the Gallipoli Peninsula in April, 1915, and the evacuation in December, 1915-January, 1916:—

Wing-Captain Frederick Hugh Sykes, R.N.A.S.
Commander Charles Rumney Samson, D.S.O., R.N. (Wing Commander, R.N.A.S.).
Lieutenant-Commander Robert Hamilton Clark-Hall, R.N. (Wing Commander, R.N A.S.).
Lieutenant Cecil John L'Estrange-Malone, R.N. (Squadron Commander, R.N.A.S.).
Lieutenant Richard Bell Davies, V.C., D.S.O., R.N. (Wing Commander, R.N.A.S.).
Flight Commander Reginald Lennox George Marix, D.S.O., R.N.A.S.
Lieutenant Charles Humphrey Kingsman Edmonds, D.S.O., R.N. (Flight Commander, R.N.A.S.).
Flight Commander Charles Henry Butler, R.N.A.S.
Flight Lieutenant George Bentley Dacre, D.S.C., R.N.A.S.
Flight Lieutenant Gordon Lindsay Thomson, R.N.A.S.
Flight Lieutenant Edward Harris Dunning, R.N.A.S.
Flight Lieutenant Gilbert Formby Smylie, D.S.C., R.N.A.S.
Carpenter James John Brownridge, R.N. (Warrant Officer, First Grade, R.N.A.S.).

For good services in action during the period above referred to:
Chief Petty Officer Herbert Bradford, O.N. M.204, R.N.A.S.
Petty officer Cyril Brewe, O.N. 13987, R.N.A.S.
Chief Petty Officer Albert Herbert Cummings, O.N. F.667, R.N.A.S.
Petty Officer Mechanic Arthur Ernest Close, O.N. 234743, R.N.A.S.
Chief Petty Officer Edmond Dessaussois, O.N., F.1663, R.N.A.S.
Chief Petty Officer (2nd Grade) John Evason, O.N. 200966, R.N.A.S.
Chief Petty Officer Hugh John Hughes, O.N. F.892, R.N.A.S.
Petty Officer Arthur Percy James, O.N F.174, R.N.A.S.
Petty Officer Alexander Jack, O.N. F.677, R.N.A.S.
Petty Officer Frederick Kerchey, O.N. F.700, R.N.A.S.
Chief Petty Officer George Lacey, O.N. 272252, R.N.A.S.
Chief Petty Officer Herbert Poyntz Leigh, O.N. M.947, R.N.A.S.
Chief Petty Officer Harry Nelson, O.N. F.8945, R.N.A.S.
Chief Petty Officer Percy Randolph Pratt, O.N. 344680, R.N.A.S.
Chief Petty Officer Edward John Prothero, O.N. F.676, R.N.A.S.
Petty Officer Mechanic Albert Edwin Platford, O.N. R.M.A.-11363, R.N.A.S.
Chief Petty Officer David Morris Rees, O.N. 344437, R.N.A.S.
Chief Petty Officer Charles Snow, O.N. 347686, R.N.A.S.
Chief Petty Officer John Sutherland, O.N. 272328; R.N.A.S.

June 26th, 1916.

From Eastern Mediterranean Dispatches.

Flight Commander (Acting Squadron Commander) Joseph Ruscombe Wadham Smyth-Pigott, D.S.O., R.N.
Flight Sub-Lieutenant Isaac Henry Woolf Barnato, R.N.A.S.

* * *

July 6th, 1916.

From the dispatch from Admirel Sir John Jellicoe, G.C.B., G.C.V.O., Commander-in-Chief, Grand Fleet, reporting the action in the North Sea on May 31st, 1916:—

FROM SIR DAVID BEATTY'S REPORT.

"Lion," June 19th, 1916.

From a report from "Galatea" at 2.25 p.m. it was evident that the enemy force was considerable, and not merely an isolated unit of light cruisers, so at 2.45 p.m. I ordered "Engadine" (Lieut.-Commr. C. G. Robinson) to send up a seaplane and scout to N.N.E. This order was carried out very quickly, and by 3.8 p.m. a seaplane, with Flight Lt. F. J. Rutland, R.N., as pilot, and Assistant Paymaster G. S. Trewin, R.N., as observer, was well under way; her first reports of the enemy were received in "Engadine" about 3.30 p.m. Owing to clouds it was necessary to fly very low, and in order to identify four enemy light cruisers the seaplane had to fly at a height of 900 feet within 3,000 yards of them, the light cruisers opening fire on her with every gun that

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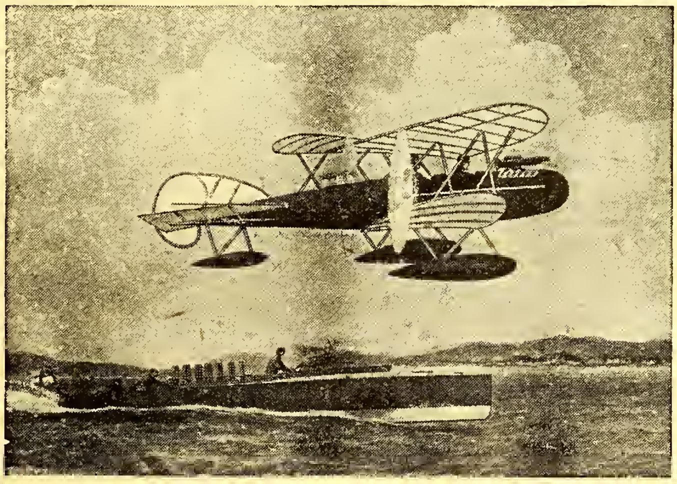

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would bear. This in no way interfered with the clarity of their reports, and both Flight Lieut. Rutland and Assistant Paymaster Trewin are to be congratulated on their achievement, which indicates that seaplanes under such circumstances are of distinct value.

The work of "Engadine" appears to have been most praiseworthy throughout, and of great value. Lieut. Commr. C. G. Robinson deserves great credit for the skilful and seamanlike manner in which he handled his ship. He actually towed "Warrior" for 75 miles between 8.40 p.m., May 31st, and 7.15 a.m., June 1st, and was instrumental in saving the lives of her ship's company.

July 25th.

From the dispatch from Vice-Admiral Sir Reginald H. S. Bacon, commanding the Dover Patrol, reporting the operations of the Dover Patrol since December 3rd, 1915:—

In addition to the daily reconnaissance and protective work performed by the Royal Naval Air Service on the Coast, eleven organised attacks against the enemy's aerodromes and thirteen attacks on enemy vessels have been carried out.

Nine enemy machines and one submarine have been destroyed by air attack, and appreciable damage has been inflicted on military adjuncts.

The services rendered by the Naval aviators in Flanders, under Acting Captain Lambe, have been most valuable.

Sept. 15th, 1916.

From the dispatch from Admiral Sir John R. Jellicoe, G.C.B., G.C.V.O., Commander-in-Chief, Grand Fleet:—

"Iron Duke," Aug. 23rd, 1916.

Lieutenant Frederick Joseph Rutland, R.N.. (Flight Lieut., R.N.A.S.).

Dec. 31st, 1916 ("Gazette" of Jan. 1st, 1917.)

The following Man has been mentioned in dispatches:—
Wt. Officer, 2nd Grade, Reginald Henry Mullin, R.N.A.S.

MENTIONED IN MILITARY DISPATCHES.

July 12th, 1916.

From the dispatch from General Sir Charles Munro, respecting operations of the Mediterranean Expeditionary Force to April 10th:—

Royal Naval Air Service.

Commander C. R. Samson, D.S.O., R.N., Wing Commander, R.N.A.S.
Lieutenant-Colonel E. L. Gerrard, R.M.L.I., Wing Commander, R.N.A.S.
Lieutenant R. B. Davies, V.C., D.S.O., R.N., Wing Commander, R.N.A.S.
Captain H. Fawcett, R.M.L.I., Acting Wing Commander, R.N.A.S.
Flight Lieutenant G. L. Thomson, D.S.C., R.N.A.S.
Flight Commander H. Stanley-Adams, R.N.A.S.
Midshipman E. K. H. St. Aubyn, D.S.C., R.N.
Second Lieutenant W. B Jones, R.M.
Flight Lieutenant E. A. O. Auldjo-Jamieson, R.N.A.S.
Carpenter J. J. Brownridge, R.N., Warrant Officer, 1st Grade, R.N.A.S.

July 13th, 1916.

From recommendations made by Major-General Townshend, in Mesopotamian operations to Jan. 17th, 1916:—
Flight Lieutenant V. Gaskell Blackburn, D.S.C.
Flight Lieutenant A. K. Robertson.
Mr. G. D. Nelson, Warrant Officer, 2nd Grade.

Jan. 27th, 1916.

From recommendations by the Field-Marshal Commanding in Chief, British Army in France:—
Commander H. C. Halahan, D.S.O., R.N.

June 15th, 1916.

From dispatches from General Sir Douglas Haig, G.C.B., Commanding in Chief., British Forces in France:—
Flight Sub-Lieutenant S. Bell.
Flight Lieutenant W. H. E. Campbell.
Petty Officer W. E. Burne, No. F.4595.
Leading Mechanic C. W. Hart, No. F.2689.

Dec. 6th, 1916.

From dispatches from Lieutenant-General G. F. Milne, General Officer Commanding British Forces at Salonika, referring to summer operations on the Struma and Doiran-Vardar fronts:—
Captain (temporary Major) C. F. Kilner, D.S.O., R.M.

THE AIR MINISTRY.

As this paper goes to press it is announced that Lord Cowdray of Midhurst has accepted the post of Air Minister. Up to the present Lord Cowdray has had nothing to do with aircraft, but he is known as a successful organiser of railways, which shows, at any rate, that he has imagination, which is one of the most necessary qualities for an Air Minister. His success will necessarily depend, therefore, on whether he is willing to take the advice of those who know what is wanted on active service, and of those who know what can be produced to meet such needs.

It was announced on Dec. 30th that Lord Sydenham had tendered his resignation as a member of the Air Board.

Since Lord Curzon became a member of the War Cabinet, Lord Sydenham has presided over the Board in his stead. Lord Sydenham's great ability and his assiduity in investigating every question raised before the Air Board show him to be eminently fitted to become Air Minister himself.

A GUIDE FOR BUYERS.

At the request of numerous readers and advertisers it has been decided to publish in The Aeroplane a Buyers' Guide. The first issue thereof appears at the end of the paper this week.

It must be clearly understood that this does not pretend to be a complete aeronautical directory, as such a publication would constitute an offence against the Defence of the Realm Act, inasmuch as it would furnish the enemy with means of estimating the output of aircraft in this country.

The Buyers' Guide will consist of a complete list of such aircraft constructors as are already well known, and also of firms outside the industry who are in a position to supply accessories and raw material.

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ANSWERS TO CORRESPONDENTS.

Owing to excessive pressure on space the usual columns of answers to correspondents has perforce been held over.

A VACANCY.

A vacancy exists in the editorial office of The Aeroplane for a thoroughly competent shorthand typist, male (ineligible for the Services) or female. A good salary will be paid to a capable person. Speed and accuracy and a personal interest in aviation are essential. No one equipped solely with good intentions and the ability to hope for the best need apply. The position offers considerable prospects to the right person.

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GERMANY'S NAVAL AIRSHIPS.

By "AUSTERLITZ."

As regards the Zeppelin airships of the naval class, the least one can say about the information which follows hereafter is that it is as accurate as any other that has filtered through neutral and other channels.

The following are the outstanding facts regarding this list: All matter in sections 1, 2, 3, 4 is absolutely the genuine stuff; the airships of classes A, B, C have been described in detail by many Swiss and Italian magazines, although often with errors, and have here been corrected according to data given the writer by a neutral who just returned from Germany. The existence of class D is beyond doubt, although opinions differ regarding their volume and power plant. Finally, there is undoubtedly a larger type than the L.33, for a power plant of seven or even eight motors has actually been seen on recent airships by various observers. I would not bet a cent that the L.33 class actually displace 54,000 cubic metres, for although I may be mistaken, I personally believe they are rather between 45,000 and 50,000 cubic metres. I repeat I do not vouch for the correctness of the displacement of classes D, E, F, but I most emphatically do vouch for the linear dimensions given.

Incidentally, one might remark that Count Zeppelin himself announced in 1913 the increases in size for which calculations had been made, and gave the master diameters of the types to be as 17.5 m., 20 m., 22 m., 25 m., and 30 m. *Et voilà.*

And one more thing, if you put down 250 grammes (i.e., about 0.5 lbs.) as the fuel and oil consumption (including water) per h.p. hour, and multiply according to power plant, you will find out there has never been, nor will there be for a time, a Zeppelin having an endurance of 75 or 100 hours at full speed, as has been said about the naval airships. For a 40 hrs. endurance with a power plant of 1,000 h.p. would alone necessitate carrying ten tons of fuel, always assuming Maybach fuel consumption.

Naval Airship Division.

Headquarters: Cuxhaven.—The eventual strength of the Naval Airship Division (Marine-Luftschiff-Abteilung) was laid down in the four years' building programme authorised by the Reichstag on October 13th, 1913, providing $2,750,000 for the construction of 10 airships of the rigid type, $3,500,000 for the construction of two first-class air harbours and several subsidiary ones, all fitted with revolving sheds; and $2,500,000 for the maintenance of the *matériel.*

Two airship squadrons, each to consist of four active and one reserve units, were to be organised and stationed at the first class air harbours of Heligoland and Tondern, respectively. Second-class air harbours were either to be created or already existed at Emden, Wilhelmshafen, Cuxhaven, Hamburg, Kiel, Wismar, Rostock, and Königsberg. In Hamburg and Königsberg private hydrogen generating plants are available. This programme was to be completed by January 1st, 1918.

At the outbreak of the Great War the strength of the Naval Airship Division consisted of one airship (L.3) commissioned and four (L.4-L.7) building; the L.3, L.5, and L.6 were of the Zeppelin type, the L.4 and L.7 of the Schutte-Lanz type. In addition three air-liners of the German Airship Navigation Co. (Delag) of Frankfurt, had been chartered to serve as training airships; these were the "Sachsen," "Hansa," and "Viktoria-Luise."

The airships of the Naval Airship Division all bear the mark L. (Luftschiff) regardless of their type, and are numbered currently.

Class A.

This class represent the highest development of orthodox Zeppelin design. The hull, made of aluminium trellis-work, is in the form of a cylinder with ogival ends, the bow being but slightly blunter than the stern; a triangular keel fitted as a gangway connects the two open cars and contains in the middle a closed cabin. Cross-wise monoplane fins and elevator, multiplane rudder.

L.3 (May 11th, 1914), L.5 (November, 1914), L.6 (December, 1914).

L.8 (February, 1915), L.9 (March 12th, 1915).

Builders: Zeppelin Works, Friedrichshafen.
Length: 158 m. (521.4 ft.).
Beam: 16.6 m. (54.8 ft.).
Height: 18.9 m. (62.4 ft.).
Fineness ratio: 9.5 to 1.
Volume: 27,000 mc. (953,000 cubic ft.).
Total lift: 29.7 tons.
Useful lift: 8 tons.
Compartments: 18.

Propelling apparatus: Four 210 h.p. 6-cylinder Maybach engines (equals 840 h.p.) mounted in twin-units on each car and driving through shaft and bevel gear transmission four 2-bladed side propellers. Fuel consumption, 0.240 kg. (0.528 lbs.) per horse-power-hour, 1,200 r.p.m.

Full speed: 80 km. (50 miles).
Full speed endurance: 26 hours.
Maximum altitude: 2,500 m. (8,250 ft.).
Complement: 16.

Armament: (1) Four Maxims mounted on the cars and firing broadsides; (2) 1.5 tons of explosives.

Notes.—The L.3 stranded during a storm on February 17th, 1915, near Esbjerg; the crew were saved and interned, but the airship was a total loss. The L.5 was destroyed on June 7th, 1915, in the airship shed of Evere by Flight Sub-Lieuts. J. P. Wilson and J. S. Mills, R.N.A.S. The L.6 was set on fire and destroyed in mid-air on the same day near Ghent (Gand) by the late Flight Sub-Lieut. R. Warneford, R.N.A.S. All the crew perished. The L.8, while returning from a raid on England, was engaged by Flight Commander Bigsworth, R.N.A.S., on May 17th, 1915, near the Belgian coast, and so damaged that she was wrecked on landing near Tirlemont. All of the crew are reported to have thereby been killed. The L.10, while returning from a raid on England on August 10th, 1915, was engaged and wrecked off Ostende by the Dunkirk squadron of the R.N.A.S.

The L.9 is thus the only survivor of this class.

Class B.

This class is characterised by an ellipsoidal hull built up of laminated wood girders forming a closely meshed lattice-work which is kept under tension by wire stays. There are five cars, four of which are crosswise hung from the hull by cables and constitute the engine-rooms; the fifth car is rigidly connected with the hull near the bow, and serves as the navigation room. Cruciform "fin-and-flap" tail. No keel.

L.4 (January, 1915), L.7 (February, 1915), L.? (1915), L.21 (1915).

Builders: Schutte-Lanz Works, Rheinau, near Mannheim.
Length: 165 m. (544.5 ft.).
Beam: 18.4 m. (60.7 ft.).
Height: 21 m. (69.3 ft.).
Fineness ratio: 8.9 to 1.
Volume: 30,000 mc. (1,059,000 cubic ft.).
Total lift: 33 tons.
Useful lift: 14 tons.
Compartments: 7.

Propelling apparatus: Four 240 h.p. Mercedes engines (equals 960 h.p.) mounted singly on each engine-car, and driving through a clutch one 2-bladed rear propeller each. Fuel consumption: 0.240 kg. (.528 lbs.) per h.p. hour.

Full speed: 85 km. (53 miles).
Full speed endurance: 26 hours.
Maximum altitude: 2,500 m. (8.250 ft.).
Complement: 16.

Armament: (1) Five Maxims, mounted one on each car; (2) 1.5 tons of explosives.

Notes.—The L.4 foundered in a storm on February 17th, 1915, off Esbjerg; four of the crew were lost with the airship, the remainder were interned. The L.7 was shot down by H.M. ships "Galatea" and "Phaeton," on May 4th, 1916, off the Schleswig coast. Seven of the crew were rescued and made prisoners. The L.21 was set on fire and destroyed with all aboard on September 3rd, 1916, near Cuffley, by Lieutenant William L. Robinson, V.C., R.F.C.

Class C.

The airships of this class resemble, generally speaking, those of Class A, except for the stern, which is pointed, and carries in lieu of multiplane-tail surfaces a cruciform 'fin-and-flap" tail. Cars and gangway like on Class A. Hull frame: aluminium lattice work.

L.11 (July 10th, 1915), L.12 to L.19 (August to November, 1915).

Builders: Zeppelin Works, Friedrichshafen and Potsdam.
Length: 160 m. (528 ft.)
Beam: 17.5 m. (57.8 ft.)
Height: 19 m. (62.7 ft.)
Fineness ratio: 9.1 to 1.
Volume: 30,000 mc. (1,059,000 cubic ft.)
Total lift: 33 tons
Useful lift: 10 tons.
Compartments: 18.

Propelling apparatus: Five 210 h.p. 6-cylinder Maybach engines (equals 1,050 h.p.), two of which are mounted in the bow-car and drive two 2-bladed side-propellers; the stern-car houses three engines, two of which drive two side-propellers, while the third engine drives through a clutch transmission a rear propeller.

Full speed: 85 km. (53 miles).
Full speed endurance: 26 hrs.
Maximum altitude: 3,500 m. (11,550 ft.).
Complement: 16.

Armament: (1) Four Maxims mounted on the cars and one on the roof, near the bow; (2) 2 tons of bombs.

Notes.—The L.15 was damaged, while raiding England, by

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anti-aircraft guns, and by Lieut. A. de W. Brandon, R.F.C., and came down on April 1st, 1916, in the mouth of the Thames, near Kentish Knock, where the crew scuttled the airship and surrendered. The L.18 caught fire and blew up on Nov. 17th, 1915, in the airship dock at Tondern. The L.19 was damaged by anti-aircraft guns during a raid on England, and subsequently foundered on February 2nd, 1916, in the North Sea with the entire crew.

Class D.

This class differs from the one preceding, essentially in that the hull has no keel, the gangway being enclosed in the bottom. The cars are entirely closed and of streamline shape; they are, on account of the third engine each carries, much longer than heretofore. Central cabin in the bottom of the hull.

L.20—L.29 (November, 1915—April, 1916).

Builders: Zeppelin Works, Friedrichshafen and Rheinau.

Length: 170 m. (560 ft.)

Beam: 20 m. (66 ft.)

Height: (?)

Fineness ratio: 8.5 to 1.

Volume: 35,000 mc. (1,235,000 cubic ft.)

Total lift: 38.5 tons.

Useful lift: 13 tons.

Compartments: 19.

Propelling apparatus: Six 210 h.p. 6-cylinder Maybach engines, mounted in triple units on each car; each unit drives through shaft and bevel-gear transmission two side-propellers, and through a clutch one rear-propeller.

Full speed: 95 km. (59 miles).

Full speed endurance: 30 hrs.

Maximum altitude: 4,000 m. (13,200 ft.)

Complement: 18.

Armament: (1) Two large bore machine-guns: one on the roof, near the bow, and one on the bow-car, mounted forwards; (2) six Maxims: two each on the cars and cabin, all firing broadsides; (3) 2.5 tons of bombs.

Notes.—The L.20 stranded on May 3rd, 1916, near Stavanger, having run out of fuel while homeward bound from a raid on Scotland. The crew were interned and the airship was blown up by the Norwegian authorities as a measure of precaution. The L.22 is reported to have been wrecked in the early part of December, 1915, at Tondern.

Class E.

This class, often referred to as the Super-Zeppelin class, may be regarded as a product of the combined Zeppelin and Schutte-Lanz designs, for although the hull frame is made of aluminium trellis work, the crosswise mounting of the cars is strongly reminiscent of Class B. No central cabin, but bomb emplacement amidships; gangway like on Class D. Four cars.

L.30 (May 29th, 1916), L.31 (June 17th, 1916), L.32 (June, 1916), L.33 (July 14th, 1916), L.34 (August, 1916).

Builders: Zeppelin Works, Friedrichshafen and Mannheim.

Length: 207 m. (680 ft.)

Beam: 22 m. (72 ft.)

Height: (?)

Fineness ratio: 9.4 to 1.

Volume: 54,000 mc. (1,906,200 cubic ft.)

Total lift: 59.4 tons.

Useful lift: 19.4 tons.

Compartments: 19.

Propelling apparatus: Six 250 h.p. 6-cylinder Maybach engines; three are mounted singly on the bow-car and in two central side cars ("power eggs") and drive through a clutch one 2-bladed rear-propeller of 8.35 m. (17.5 ft.) diameter each; the three remaining engines are mounted in a triple-unit on the stern car and drive two side propellers and one rear-propeller of the same diameter as above.

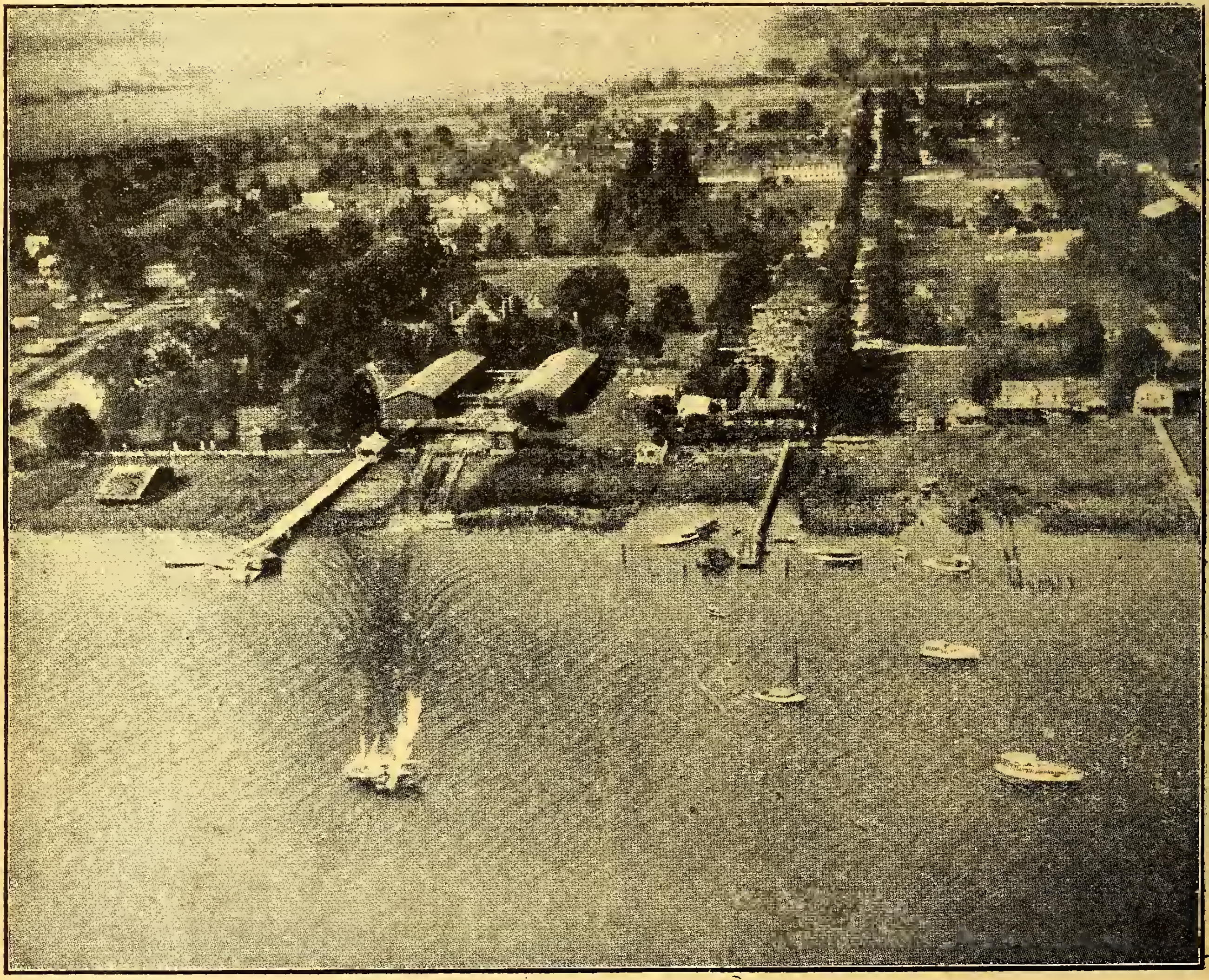
Full speed: 105 km. (65 miles.)

Full speed endurance: 35 hrs.

Maximum altitude: 5,000 m. (16,500 ft.)

Complement: 20—22.

Armaments. (1) Two large bore machine-guns carried side by side on roof, near the bow, on collapsible tripods; one similar gun is mounted on the roof, near the stern; (2) six Maxims, viz.,



(Published by courtesy of the "Aerial Age," New York.)

The flying grounds of the Philadelphia Aviation School at Essington, photographed from one of the school machines. The school was organised by Mr. Robert Glendinning, the Philadelphia banker, and during the past season thirty-two students received instructions. Three of the flying boats will be seen on shore by the hangars, and one going out.

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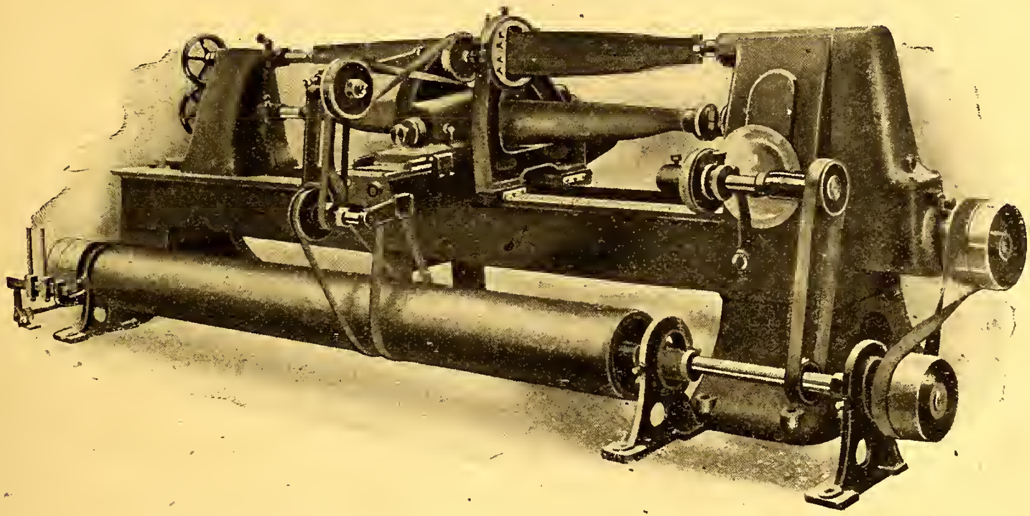

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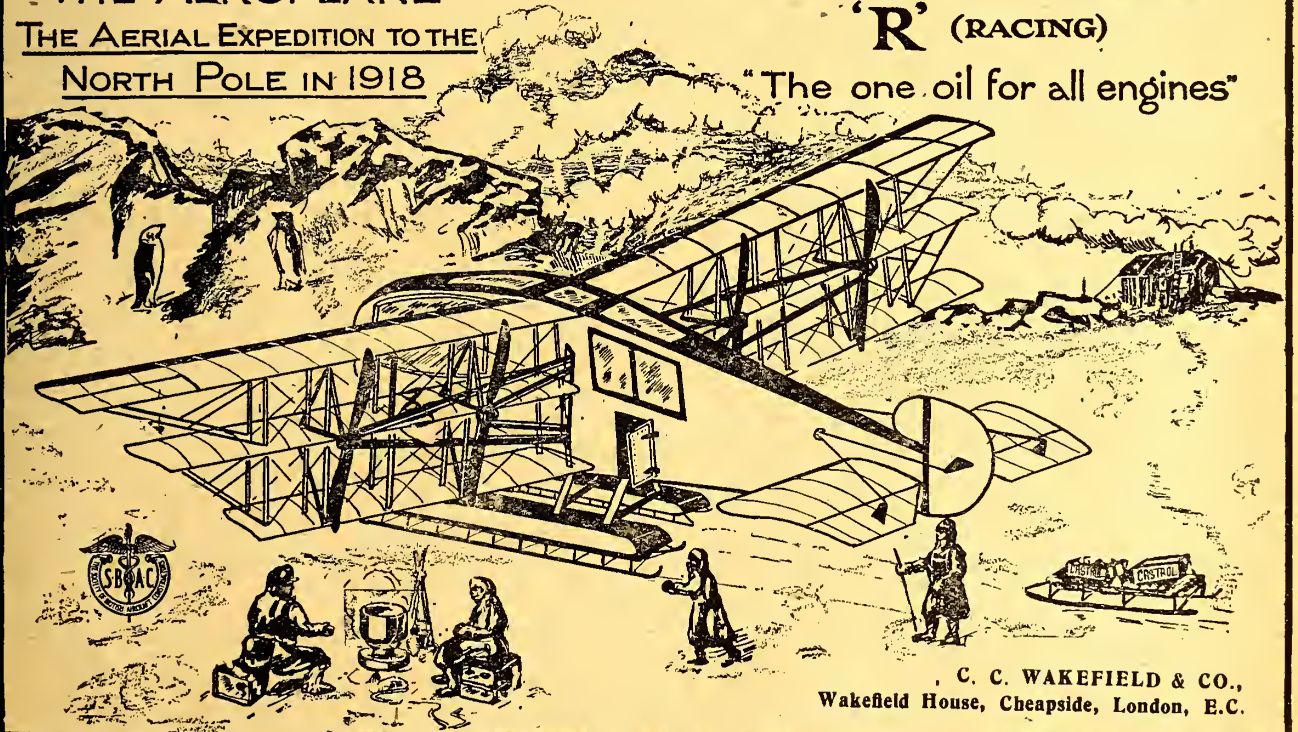

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two each on the bow and stern-cars, and one each on the side-cars, all firing broadsides; (3) sixty bombs aggregating 3.5 tons.

Notes.—The L.31 was shot down by A.-A. guns and aviators while raiding London on October 2nd, 1916, and was destroyed with all aboard at Potter's Bar. The L.32 was shot down during a raid on London by A.-A. guns and aviators on September 24th, 1916, and fell in Essex. All of the crew were killed. The L.33 was damaged by A.-A. guns and aviators while raiding London on September 24th, 1916; landed in Essex, and was blown up by commander. Crew surrendered.

Class F.

These airships are very similar in general design to those of the preceding class; there are, however, seven or even eight engines to the power plant, with an equal number of propellers. Four cars.

Builders: Zeppelin Works, Friedrichshafen and Rheinau.
Length: 235 m. (775.5 ft.)
Beam: 25 m. (82.5 ft.)
Height: (?)
Fineness ratio: 9.4 to 1.
Volume: 70,000 mc. (2,471,000 cubic ft.)
Total lift: 77 tons.
Useful lift: 28 tons.
Compartments: (?)
Propelling apparatus: Seven 250 h.p. Maybach engines; mounted in twin-units on the bow-car, singly on two central side-cars ("power eggs"), and in a triple-unit on the stern-car. There are, consequently, six side-propellers, four of which are mounted on outriggers, and one stern-propeller. On a later model of this class the power plant consists of eight engines, there being three engines in the bow-car instead of two, so that one stern-screw is added to the propelling apparatus.
Full speed: 110 km. (68 miles).
Full speed endurance: 40 hrs.
Complement: 20—22.
Maximum altitude: 5,000 m. (16,500 ft.)
Armament: (1) Four large bore machine-guns mounted in pairs on the roof near the bow and near the stern; (2) six Maxims, mounted in pairs on the bow and stern-cars, and singly on the side-cars; (3) 4 tons of explosives.

Notes.—One airship of this class is said to have been destroyed on September 22nd, 1916, in the airship dock of Rheinau by French aviators. Another airship of this class appears to have been wrecked by the storm on November 21st, 1916, near Mayence, while en route from Friedrichshafen to Wilhelmshafen.

Two naval airships (numbers unknown) were shot down during a raid on November 28th-29th, 1916; one off Durham by aviators of the R.F.C., and one off Norfolk by aviators of the R.N.A.S. Another Naval airship, whose number is unknown, apparently foundered off Sylt on September 3rd, 1916, while homeward bound from a raid on England. (Witnessed by numerous vessels).

SPINNING

BY GEORGE H. BETTINSON

Most pilots, more especially pupils, are sure to experience some time during their career a "spin." These few notes, therefore, are written in the hopes that they will save some accidents caused by careless and inexperienced pilots, who are in nine cases out of ten directly responsible for their machines "spinning."

Spinning arises from "side-slipping." Side-slipping is of two kinds: (1) Outwards side-slip and (2) inwards side-slip.

When a spin occurs a pilot must immediately ascertain which of these his side-slip is, and also whether his air speed is normal or abnormally low. The former is almost always known when it is possible for the flier to be aware that he is turning (i.e., when he is not in a fog or a cloud). The air speed can only be known with any assurance from the air speed indicator.

In general, when a machine gets out of control, the first thing to do is to throttle the engine right down immediately. Then, if there is fair height, the machine should be dived. If there is not room to do this there will probably be a smash in any case, and it is accordingly better that the engine be switched right off so that all danger of fire is avoided.

The problem of spinning is best considered on the stable and unstable aeroplane separately.

1. If the aeroplane is a stable one and the speed correct, side-slips in nine cases out of ten correct themselves. Suppose the side-slip is caused by the pilot doing too wide a turn with an excessively heavy bank, the aeroplane will, under gravity, side-slip towards the ground, and the resultant side-wind directed upwards from the earth will tend rapidly to re-align the planes, thus curing the side-slip, if there is space enough.

2. On the other hand, if the speed is correct but the aeroplane unstable, the only way a spin can occur is by the fin surface aft being inadequate or else wrongly disposed. The flier's best course of action is to throttle down his engine and dive the machine for speed recovery, at the same time firmly holding his rudder appropriately—the straight position is generally best.

We have now considered the causes of slipping on stable and unstable aeroplanes given that the air-speed in each case is correct (i.e., normal or slightly abnormal). We will now consider the cases of the unstable and stable aeroplanes with the speed too slow.

3. Several conditions may occur in various unstable aeroplanes.

(a) The fin surface alone or the fin surface plus rudder surface may be inadequate.

(b) The rudder reaction may be too strong for the pilot to master it.

(c) The total fin surface aft (i.e., fin plus rudder) may be excessive.

(d) The operation of the wing controls at extreme slow speeds may produce spinning tendencies.

(e) The fin surface may be unsymmetrical below and above the body of the aeroplane.

In (a) and (b) the pilot should hold the rudder firmly straight and dive for speed recovery, or the rudder may be slightly turned in opposition to the direction of the spin.

(c) This case is most unusual. The effect of too large a fin area aft would probably only be got by adding to the fin area the area of the rudder, which is supposed to be held rigid. The remedy is to let go the rudder for a moment and dive the machine whilst she re-aligns and becomes controllable again.

In (d) the only occasion when a spin can arise is when an underbanked turn is made presumably because the machine is very near the ground. The mere fact that there is a spin tends to raise the outer wing, which is revolving at a greater speed.

Let us suppose now that the pilot for some reason or other is trying to avoid the bank. He accordingly pulls the inner wing flap down in order to increase the lift of this wing, but much to his surprise, unless he is an experienced pilot, his action (contrary to the effect at normal flying speeds) diminishes the lift of this wing, thereby increasing the bank. This action certainly gives the aeroplane its proper bank, but at the same time it also causes a more rapid spin around the inner wing tip and there will be a smash unless there is sufficient ground clearance.

The general instruction in (d), therefore, to the flier whose air-speed is abnormally low is to turn the outer flap down, which will retard the spin. We learn by this that lateral control effects are reversed at stalling speeds.

To continue, the moment the aeroplane is straightened out by this inverted action, the pilot should open the engine "full out" in the hopes that the machine will attain sufficient speed to avert a serious "pancake."

The moral, therefore, of the latter case is never to attempt a turn with the speed of your machine near stalling point. Unfortunately, this particular form of error is one in which there are special excuses for falling into.

For example: If the aeroplane is over ground which cannot be alighted upon, and the engine suddenly "peters out," the flier will want to do two things.

(1) Turn the machine back towards good landing ground just quitted, and

(2) Maintain as much height as possible.

The writer himself has experienced this when flying a machine "somewhere" over the East Coast. In trying to avoid some telegraph wires on the cliffs, the act of turning caused considerable loss of speed and consequent loss of height, and the machine, which, by the by, was a stable one (a B.E.2c.), got into a spin, ending in a nose dive into the compromising place he was trying to avoid—the sea.

Case (e) generally applies to small scouting aeroplanes having large engines in relation to their size. When flying at low speeds the swirl of the slip-stream affects the unsymmetrical fin surface, creating a bank at stalling speed.

(4) Stable aeroplanes with speed too slow: First, considering outward side-slips under each of the different heads given in paragraph 3.

(a) Is non-existent.

(b) The rudder must be held firmly straight.

(c) Is non-existent.

(d) The remedy is the same as when the speed is normal.

(e) Ditto.

Inwards side-slips generally only occur with stunt flying, except in the case of flying in a cloud or in a fog, when the machine may unwittingly be held on a bank with the rudder in a straight position, giving the same results as an inward side-slip due to an over-banked turn. The remedy is to cut out the engine and hold the rudder over in the direction of the side-slip, then dive.

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(Captain R.F.C.)

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„ II.—THE PRINCIPLES, HAVING SETTLED THEIR DIFFERENCES, FINISH THE JOB.

„ III.—THE GREAT TEST.

„ IV.—'CROSS COUNTRY.

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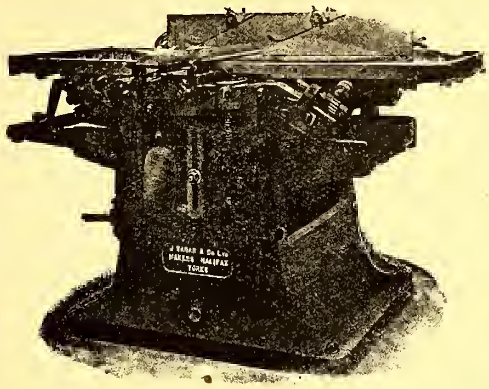

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As soon as the machine is moving almost vertically downwards the rudder must be kicked straight and the elevator pulled gently backwards. (N.B.—This procedure has been confirmed experimentally in the air.)

It does not appear worth while to discuss cases (a) to (f) separately. The main point that the pilot must remember is never to fly his machine at an air speed which is practically stalling point, and this rule is very easily observed if the pilot will watch his indicator board closely.

Stalling and flying too slowly: Some pilots have a natural tendency to judge the speed of their machines by their ground speed, and seem to forget entirely that "ground speed" is an entirely different speed from "air speed."

A pilot should always be very careful when turning a machine from flying against the wind into flying with the wind. Having turned a machine down wind, she may appear to be flying quite fast, but in reality the air speed may be almost on stalling point.

Thus, for example, if the pilot is flying a 40 m.p.h. aeroplane (40 m.p.h. being the lowest speed at which she will not stall) against a 20-mile wind, an air speed of 40 m.p.h. is quite safe (20 m.p.h. being the ground speed). Now when the pilot turns the machine down wind, he is only just safe at a ground speed of 60 miles an hour, and in reality, although the machine in relation to the ground beneath him is travelling at an enormous speed, he is only just inside the limit of stalling speed.

AN AERONAUTICAL A.B.C.

An **Aeroplane** is a production of precocious minds which flies.

A **Biplane** is an aeroplane with twice the room for the defects of a monoplane.

A **Casualty** is a by-product of an aeroplane smash.

A **Distributor** is what everyone who knows nothing of Gnomes talks about.

An **Eyebolt** is a thing with a hole in it which provides opportunity for the display of metallurgical ignorance.

A **Flight** is a thing you leave behind you when you wake up with your head on the floor and your feet on the top bed-rail.

A **Gear-box** is a thing which every embryo pilot thinks he wants, but which would be no use to him if he had it.

A **Hustle** is that which a transport officer gets on when he is ordered to ship a seaplane "immediately" on a vessel which has just been reported off Gibraltar.

An **Inspector** is a person who could build an aeroplane if he were reincarnated.

A **Joystick** (officially known as a "control lever") is an instrument which brings sorrow when abused.

A **Kite-balloon** was the result of Japanese art, a late supper and a bad dream.

A **Landing** has as many degrees of hardness as a lead pencil.

A **Mistake** is when a five-eighths bolt is designed to screw into a quarter inch nut.

A **Nacelle** is a receptacle for babies of various sizes and ages.

An **Ornithoper** is a flying machine frequently seen by probationary sub-lieutenants, R.N.V.R. or R.N.A.S., in the Isle of Sheppey.

A **Physical laboratory** is a place where they concoct empyrical formulæ from insufficient or inaccurate data.

A **Quick-release** gear is an ornament which dangles from many aeroplanes, but which has never been known to have been used.

A **Revolution** indicator is an instrument to show when the engine stops.

A **Spring** is an animal of very uncertain temper.

A **Tishbite** is a biped which can talk, dress and fly badly, but can do nothing really well.

A **Universal** joint is chiefly notable in that it is liable to come unstuck in any direction.

Volubility is the consoling angel which comforts an aviator when he arrives over an enemy fortress and discovers he has left his bombs at home.

A **Wiseacre** is a designer who allows other people to test the results of his brain storms.

An **X** is a thing which a slide rule artist plays with when he is anxious to prove that a ten-ton wire will carry a fifty-ton load.

A **Yankee** is a person who can sell aeroplanes to everybody except his fellow-countrymen.

A **Zeppelin** is the enemy airship which destroyed London two years ago.

W. L. W.

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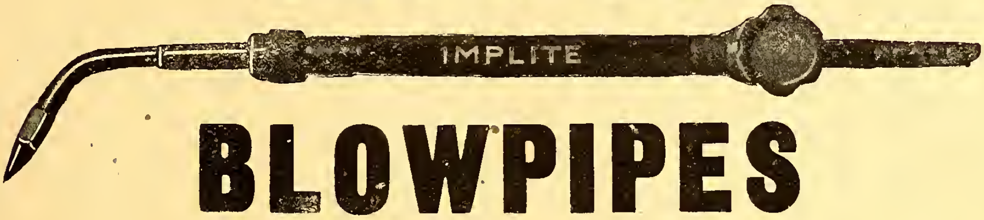

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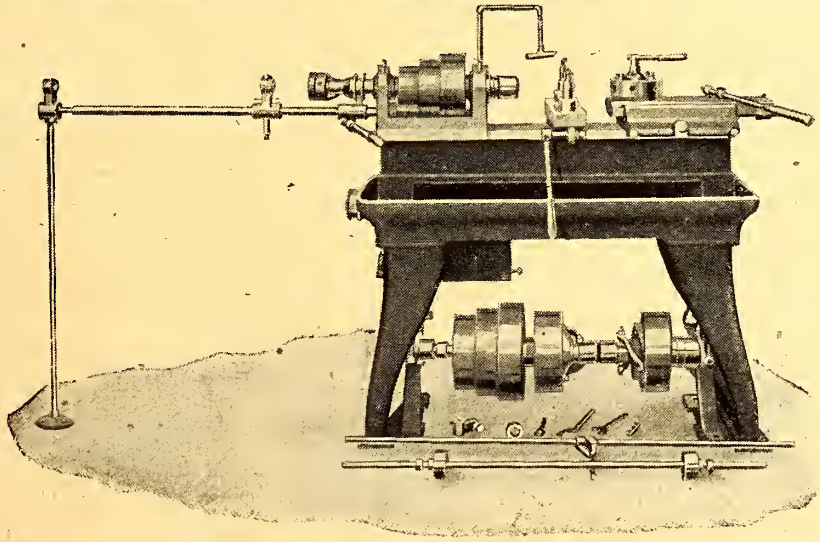

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HOW RUPERT DID NOT WIN THE WAR.

(*A ROMANCE OF THE EARLY DAYS.*)

I rather think that my friend the marine must have been related to Mr. Kipling's acquaintance, Mr. Glass, late of H.M.S. *Archimandrite,* for, barring the fact that he was very sober, and could open his eyes and still be well, he had all that distinguished sea-soldier's characteristics, especially his gift for the artificial recollection of misleading statistics. Therefore I set this story on paper without fear of let or hindrance by the Censor, for though the Censorship may plant its foot firmly on the truth lest it should escape and run *amok* among the populace, it is ever lenient to those gifted with imagination. Hence, as this lamentable story is manifestly untrue, it may be told rather as testimony to the imaginative power of a member of that gallant regiment which is usually credited with more credulity than inventiveness.

We had pulled out of a big railway terminus "somewhere in London," and as I always believe in following the adjurations of Messrs. Asquith and Co., I was travelling third class, by way of war economy. (N.B.—If Mr. Asquith had not produced his preposterous posters I should have been travelling third anyhow, *res angustæ domi* being sufficient reason without any other.)

Being somewhat *experimenté* in these matters I had collared a corner on the south side of the compartment, facing west, and my friend the marine drifted in a few minutes afterwards, and civilly passed the time of day.

As the train gathered way after passing the strategic junction of C——, I happened to look up out of the window, and saw hanging in the sky a comic object which somehow reminded me of the foolish yarn of the old lady who went into the greengrocer's and asked, "Have you got anything in the shape of cucumbers to-day, Mr. Smith?" and was annoyed when Mr. Smith replied, "Nothing 'ceptin' bananas, Ma'am."

The idea struck me that if someone asked the mess-steward at the Air Station which we were just passing whether he had anything in the shape of sausages for breakfast, he would probably be told that there was nothing 'ceptin' kite-balloons. The sheer fatuity and feebleness of the jest made me smile unconsciously as I looked at the K. B. swinging gently to her wire, and the marine, evidently taking me for a mere landsman grinning at the curious shape of the beast, became confidently conversational.

"Queer thing, ain't it, Sir?" said he. "That's one of our new airships. 'R. R. type' they call 'em, which, so I'm told, stands for Rampant Rupert, and distinguishes 'em from the 'S. S.' type, or Slim Samuel, which the Navy Air Service chaps call Blimps."

I agreed that the thing looked queer, and recklessly disregarding the Government's latest paper-wasting injunction—that which warns one not to talk naval or military matters in railway carriages, I asked the marine whether he had ever had anything to do with such things, for one could see him bursting with the desire to fill someone up with a yarn about kite-balloons.

"Have I not?" said he. "I was shipmates with one of 'em once. Off the Gallipoli Peninsular it was, and I've never had such a cruel time in my life. Heartbreaking it was, hauling poor Rupert about in our old barge of a sea-going tramp, sending him up to makee-look-see all over the shop, hauling him in again, and bedding him down all comfy like, for the night, and all for nothing, so far as I could make out."

I ventured to suggest that according to newspaper reports the kite-balloons had been very useful to our gunners in France, and that even in Gallipoli some excellent spotting had been done by such "sausages" as were there.

"That's as may be," said the Marine. "Some of 'em has and some of 'em hasn't. It's all a matter of luck where you're spotting, and who you're spotting for. If you're spotting for a real live gunnery jack, who's up to all the latest quiffs and gadgets, and likes to try new things, you can do yourself proud. But some of them flat-footed sailormen won't believe that anyone knows more than they've learnt with spending all their lives in their own tanks, and if they can't see their target from their own fire-control station they won't believe Rupert can see it either. And what can you do then?"

I suggested that the Navy would learn in time how to use its latest tools, but I knew in my heart the impossibility of getting a leather-neck to admit that a flat-foot could ever learn anything till he had had it knocked into him by sheer hard hammering.

"Well," he admitted grudgingly, "I suppose some of 'em will learn in time. We done our best to teach 'em out there, but it nigh broke my heart once, when we came as near stopping the war as damn it, and didn't, just because some flag-wagging son of a Chatham tripe shop wouldn't take our signals."

The idea of Rupert stopping the war pleased me, so in open defiance of the Defence of the Realm Act, I questioned a member of the King's Armed Forces respecting the operations and movements of the aforesaid Forces on active service. As my Marine was obviously primed with his story no great skill was needed to pump it out of him.

"It was like this here," he said. "We were laying to the north of the coast, and Rupert was up at a couple of thousand feet with a proper star turn observer officer in the basket, watching the port of Maidos, where the Turks used to land food and ammunition and troops from Asia. All of a sudden like the observer telephones down that he'd spotted His Holiness the Sultan's made-in-Germany Battleship *Goeben* coaling off Maidos, with lighters made fast all round her, and an absolute sitter for any Navy gunner who knew where he was on the operations map.

"We signals over to the old *Incomprehensible,* a number one size battleship laying a bit to the east of us, to try a sighter from a fifteen-inch at 121,X,9. After a due and suitable interval, bang goes a fifteen over the top of the peninsula and the observer howls with delight down the telephone, 'Good! Oh, damn good! Line perfect, 200 yards short. Lengthen 200. Rapid fire!'

"We signal according to the *Incomprehensible,* and wait a minute, and nothing happens. Then we start makin' inquiries as suitable. And presently back comes a signal, 'We are informed that we have hit the *Goeben.*'

"Natural like, we 'phone the observation officer, and he says 'No!! 200 up. Rapid fire.' So we argue a bit with the battleship, and presently, after another due and suitable interval, bang goes another fifteen-inch over the peninsula.

"This time the observation officer fairly jumps in his basket, and shouts down, 'Better! A damn sight better!! Line perfect. About 100 over. Shorten 100. Rapid fire.' Which we transmit, according as stated, to the battleship.

"Then we wait for the big stuff to get in its fine work, but nothing happens. Mr. Smith in the basket begins singing out on the 'phone as if his shaving water was late, and our flight-commander starts sending rude signals to the gunnery jack on the battleship, inquiring whether his guns have got any obstructive disease, or whether it's only that his gunners haven't recovered from their last spell of leaf at Mudros. And then, after a

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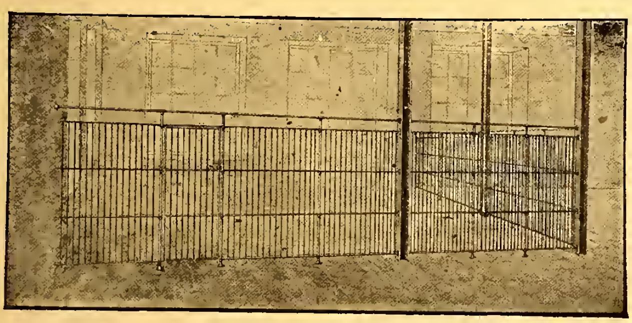

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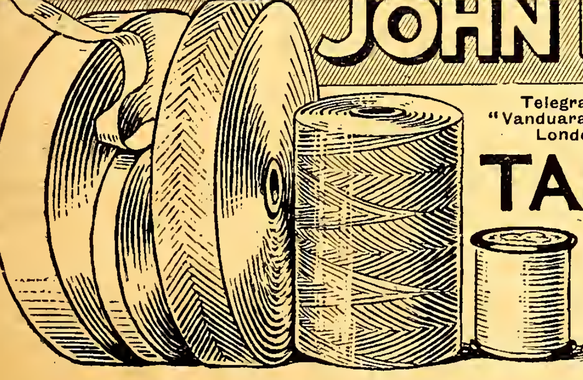

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proper and dignified period of time, such as would be right for a first-class battleship talking to a sausage-carrying steam-barge, along comes a signal, '*We* are informed that we have *sunk* the *Goeben*.'

"Mr. Smith, he nearly falls out of the basket trying to semaphore to the *Incomprehensible* himself, by way of short-circuiting the 'phone and signal system, and his language on the 'phone, when he'd collected himself a bit, was something to make a Canadian A.S.C. mule-driver get out his dictionary.

"Then we resume the argument with the battleship and tell her on our honour as British officers and gentlemen and what-not that she is deceiving herself, or that someone is pulling her leg, or that her yeoman of signals ought to be in Yarmouth Asylum, or Bodmin Gaol, or that she's using the wrong code, and that anyhow she hasn't sunk the *Goeben*, and she hasn't stopped the war, and that she couldn't hit the Gallipoli Peninsula unless someone painted a bull's-eye on its side, and held the gunnery jack's hand while he aimed his best pop-gun at it. And lots more loving remarks like that.

"And the *Incomprehensible* she signals back all polite like that she knows she's sunk the *Goeben*, because a kind gentleman in the British Army who is sitting on a ridge overlooking the Marmora, and all that in him is,—as the prayer-book says—has told her so by wireless, and he ought to know better than any disorganised bank clerk with wavy stripes sitting in a clothes-basket at the top of a sixpenny kite-string. And that if the said joker with the sea-sick stripes don't apologise for his waywardness, forsooth, the *Incomprehensible* 'll take official steps to find out what the Admiral has to say about his attempts to excite His Majesty's ship to waste His Majesty's fifteen-inch ammunition. And what's the good of rapid fire, anyway, when two of the best will sink any Orientalised Hun strafing-boat within ten miles of the *Incomprehensible's* gun-layers. And some more things similar, which we transmitted properly circumflected-like to Mr. Smith in the basket.

"Mr. Smith, he said nothing for a while. And then he 'phones down, brief and business-like, 'Tell H.M.S. *Incomprehensible*, with my compliments, that the *Goeben* has cast off her lighters and is now half-way to Constantinople.'

"With that, nothing further occurs for a few minutes, and then Mr. Smith he 'phones down again and says very quiet and sweet like, 'Will you be so kind as to inform H.M.S. *Incomprehensible*, with my most distinguished salutations, that I have been studying the operations map, brought up to date this morning, and comparing our positions on land with the elevations as seen from here, and there isn't a solitary point in our line from which Maidos or the anchorage off Maidos can be seen? Also, that the enemy has a top-hole wireless station at Kil-id-Bahr, which has an outlook towards Maidos, so the chances are that the gentleman who sank the *Goeben* for her is a ruddy Turk. And now, if you please, I think I'll come down and have lunch.'

"So that's why Rupert didn't stop the war."

Here, fortunately, the train drew up at my station, and I had to get out, or Heaven knows what further breaches of the Defence of the Realm Act my friend the Marine might not have induced me to commit; even to the crowning crime of buying intoxicating liquor for a soldier—albeit a sea-going one—if we had descended at the same station. But, I ask you, does not such an imagination deserve encouragement?

The only real merit in this immoral tale is that it may perhaps indicate to some young officer in His Majesty's Navy one of the many methods by which an astute enemy *might* pull his leg, and it may suggest some of the tribulations which a kite-balloon section *might* suffer if the Navy and Army did not take the new instrument as seriously as they do.—C. G. G.

AT VERDUN.

The special correspondent of the "Morning Post" with the French Army writes of the recent fighting at Verdun, that the new method implies new infantry, new artillery, and new aviation tactics, as well as a perfect organisation behind the lines. Artillery, infantry, Air Service must work together and fit one into the other to form a mosaic of victory.

"Our Allies' mastery of the air was never for a moment in doubt. Throughout the day I never saw a single German aeroplane or a single French anti-aircraft gun in action. On the other hand, there were many more French aeroplanes in the air than it was possible to count. The weather was overcast though clear, and the clouds were low, so that the airmen could not fly at any considerable altitude. They were everywhere, skimming a few hundred feet above the heads of the French infantry as it swept over the crests of the Meuse hills, and darting back from the smoke clouds against which the signal rockets glittered like tinsel stars, with the news of the advance.

"Like homing pigeons they sped back to the posts of command and circled round above them to drop their messages. Just before the assault I saw one aviator who, out of sheer lightness of heart, was looping the loop over a General's Headquarters.

"On the French side there were many kite-balloons in the air. Occasionally, a drift of cloud would pass over them and obscure their view, but they were able to render valuable services in directing the French fire. Not till the end of the afternoon did an enemy Drachen dare to put in an appearance. It was well behind the lines, but its shrift was short.

"Through the glasses I saw something black fall from the smoke headlong to the ground. Overhead an aeroplane, no more than a black dot, was winging its way back to our lines. Its work had been accomplished. It had set the German Drachen afire, and the hydrogen still burnt away aloft after envelope, car, and observer had plunged down to destruction. During the rest of the afternoon no other Drachen dared to show itself.

"When the rout began—at several points of the front the German collapse amounted to a rout—aviators descended and shot down the flying enemy with their machine-guns, a manœuvre that has invariably a most demoralising effect on the troops exposed to it. It produces a feeling of helplessness and insecurity that only those who have been fired at by an aeroplane can realise.

"It was, of course, inevitable that flying so low and taking such risks the French aviators should meet with a certain number of accidents. But such accidents were surprisingly rare considering the very large number of machines in the air, and up to the end of the afternoon not one of them had resulted in loss of life."

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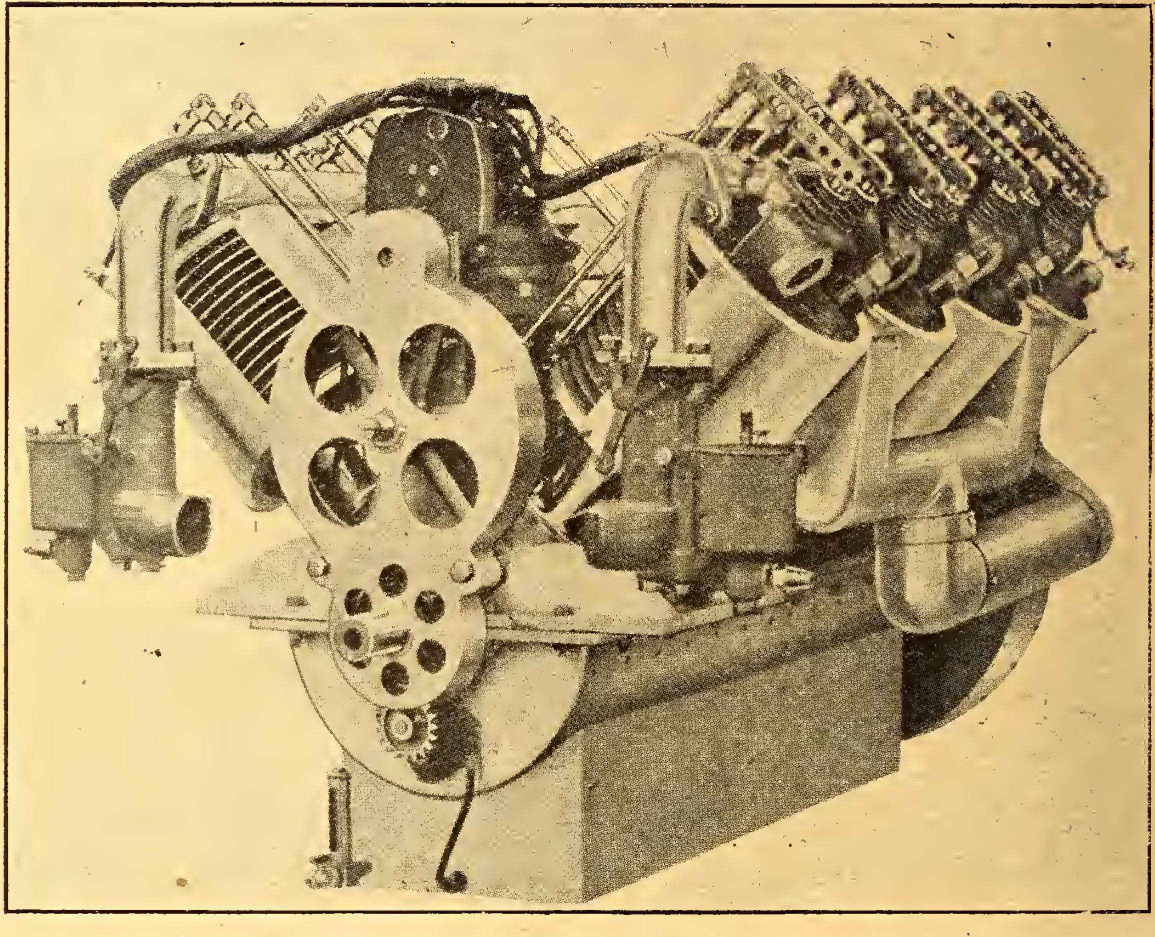
Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.



The Carburettor End of the Eight-Cylinder air-cooled Kemp Motor.

Concerning Cats' Tails: and Chances.

When some peacemongers asked General Grant how he hoped to win a war of exhaustion, quoting the Kilkenny cats, that magnificently triumphant "failure" merely replied: "Our cat has the longer tail." Now, how long the present naval, military and aerial war may last can only be definitely known on one point, and so answered; precisely as long as our determination lasts to fight it out and win. For all the evidence shows that our cat's tail is, and will continue to be, the longer.

But if we wait upon that event to prepare to win the industrial war that is already on, it is quite certain that our cat will not have the longer tail, if indeed she be not wholly smaller than her imminent foes, the American and Japanese cats. It is highly unlikely that New York, instead of London, will be the new world's money-market. Her wisest money-changers think otherwise. Or that America is now much more than the pawnbroker of Europe for the time being, and very much embarrassed with the pledges, mostly of her own securities. Whether choked with gold—as she is, like that other cat with butter, or any other way—the choking is just as effectual. It means cheap gold, actually worth less than the paper of a stronger-credited people. We may be that people, if we and our daughter-nations and Allies combine now. No less, the gold is there just now.

Let us then try to win by anticipating the industrial probability-requirements during the coming peace-war, as far ahead as we can. That is the immediate bearing of all this, upon the aero-motor question. We cannot do better than see and study, as the chance offers, precisely what is in America's hand, this first round before the call. Who knows what we may pull in on the draw to call her bluff with? But even the 200 per cent. *ad valorem ante* which we might demand, though useful to go on with, will not win us out by itself.

Weight and Resistance *v.* Petrol.

Now for war-purposes, we are piling horse-power upon horse-power. Getting great immediate results thereby, unquestionably. All of which will most probably serve as well, or even better, for the bigger functions of peace-aviation; the mail-planes, *wagonslits aériennes passagères*, and so forth. But we are not getting much ahead with our relative efficiency equation of Weight—(H.P. × P.A.)? That original 9 h.p., and then 30 h.p. Jap-Roe combination was so long ago that we have almost forgotten its spirit. Let us not forget that those H.P., P.A. factors are mutually reflective for efficiency. All sorts of quite wonderful experiments are going forward to help the P.A. We don't know what they are. But we do know, or can find out if we like, all about the available H.P. entities.

We shall have time to look, and, therefore, shall look, very much more closely into this total efficiency question after the war. Better get a glimpse now. For one of the assured demands of civil aviation will be a machine that will not be required to go very fast, or climb to higher than "sea-room" safely, but must fly, as far as possible, for a given mileage-petrol-allowance and a moderate h.p.: say, 80 h.p. at most. A machine that in her aerial way will be essentially what in old days afloat we called a rating-cheater.

This is precisely the sort of machine the Australian squatter, pannikin-overseer, and prospector or explorer anywhere, will need for long overland flights. The sort that every shore-dwelling Australian volunteer will shout for, as a seaplane, when he goes home. So will the three-to-one Englishmen who go with him. And her motor will be the kind we shall need for skimmer-planes all over the Empire for trade and "makee-look-see" generally. Why should not we make it for such an assured market?

But motor weight and radiator weight jump to the wrong side

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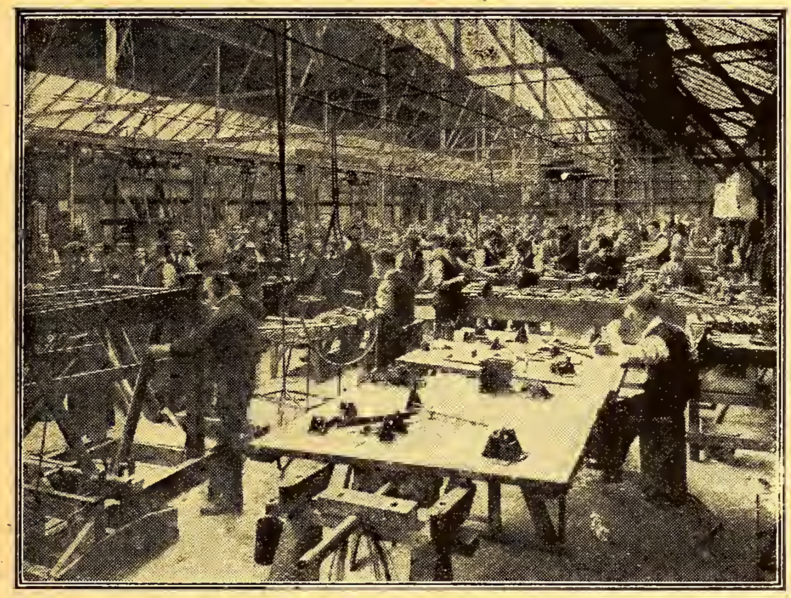

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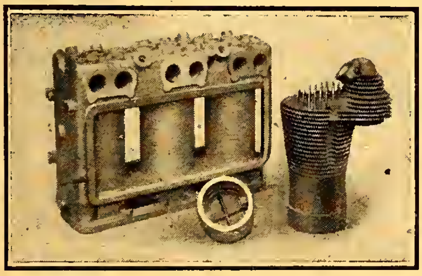

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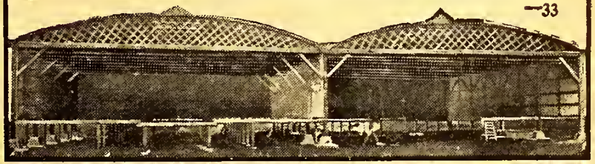

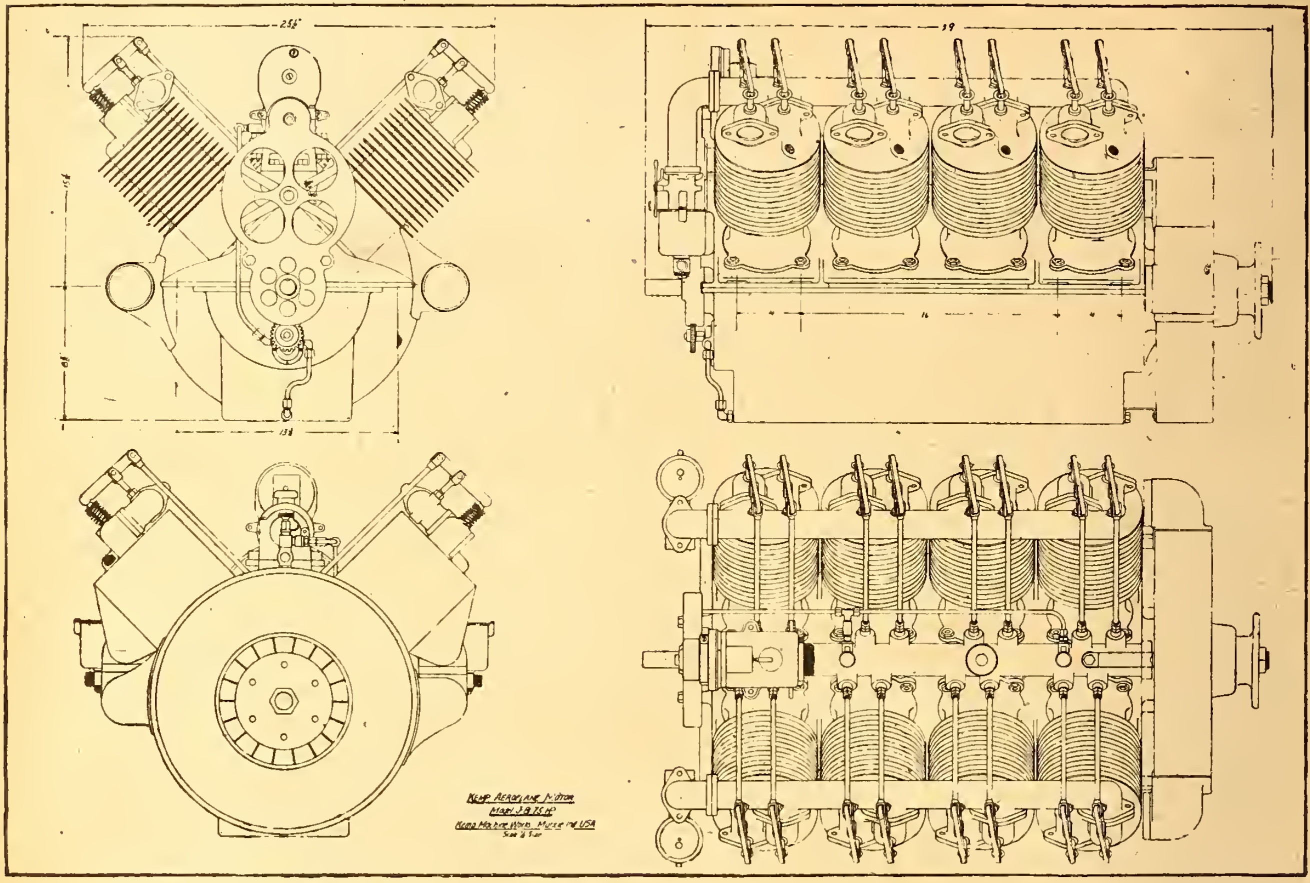

THE 75 h.p. KEMP MOTOR.—Top : Carburettor end view and side elevation. Bottom : Fan end view and plan view.

of the equation always. Therefore, I think this motor will have to be air-cooled, and of the V or vertical type, as the simpler, in any case. That is why I consider the design of the most highly specialised air-cooled motor in the U.S., if not in the world—the Kemp, of Muncie, Indiana—of such prime interest. For its specialisation as an air-cooled motor is not only as high as that of any French rotary, in the physical essentials that count most, but a note or so higher than either Renault or De Dion, and octaves above the R.A.F. On which assumption, anyway—pray prove it for yourself—there seems to be no reason why we should not make its like, as good, or a touch better. Except knowing how; which is no magic; only a matter of time and practice. And all the more—may I suggest?—of beginning now, before the market opens.

THE KEMP AIR-COOLED PROPOSITION.

Actually, there are four models of the Kemp air-cooled motor, the J.8 V type of 80 h.p. and eight cylinders of 4¼-in. bore by 4¾ stroke; and the two verticals H.6, 55 h.p. six cylinders with a ¼-in. less stroke; the J.4 of 35 h.p., and four cylinders of the same dimension; and the G.2 of 16 h.p. and two cylinders 4 in. by 4 in., a double opposed horizontal. The two latter are for hydroplanes, ice-boats and sledges: but of the two former, the six-cylinder model should at least afford power enough for school work, and the V type enough for all general purposes.

All the first three—and in a less degree the fourth—are designed in the mass, and constructed on the same system, the accessory detail only being varied to suit each model; and it will be evident from the illustrations how unusually clean and unencumbered—even for an air-cooled motor—that design and make-up are.

Appearance is not the best of it. As will be seen, the drive is direct, and the rated speed no higher than 1,150 r.p.m. Yet, although the claim is that the Kemp motors are built stouter and stronger than most water-cooled types, yet remain still lighter, the weight per rated h.p. is only 4¾ lbs. for the V type all on, and a shade under 5 lbs. for the others.

ITS PERFORMANCE AND PROSPECT.

The best performance point, however—if we may assume the actual power to be as rated and guaranteed, in itself quite good on the given dimensions and r.p.m.—is the petrol and oil consumption scale. This works out actually as low as .44 of a pint in the V type up to only .55 in the others; and of 1-12th to 1-10th of a pint of medium viscosity lubricant. There, indeed, we do seem to find not only the clearest evidence of the special merit of the Kemp design, but also the strongest support, both for their claim that their motors require nearly a fifth less petrol per developed h.p. than others, air or water-cooled; and for my own contentions as to the special commercial value and prospect of this design—or any British repetition thereof.

From every point of view, then—perhaps most of all the latter—it should be profitable to examine and discuss the physical working conditions of the proposition, and the reasons for any results, actual or only claimed. Let us grant that for oversea use, in any district where a fresh water supply is not to be had readily, there can be no two opinions. The air-cooled motor is the only practical possibility. Otherwise, it is all a question of comparative mileage-efficiency, having assured the mechanical reliability of the motor, which, of course, is to the equation of the example rather than the type.

SOME FUNCTIONAL CONSIDERATIONS AND EFFECTS.

Now, unless we embody the Lahaussois refrigerator pump, which cools instantaneously by air-injection emulsifying the water, and so requires no more than the jacket content; or unless we use the next best, the Antoinette steam-relief circulation, the chief merit of which is that it enables the cylinders to be run nearly as hot as

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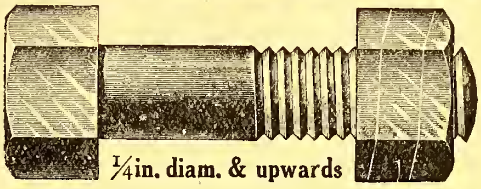
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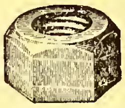

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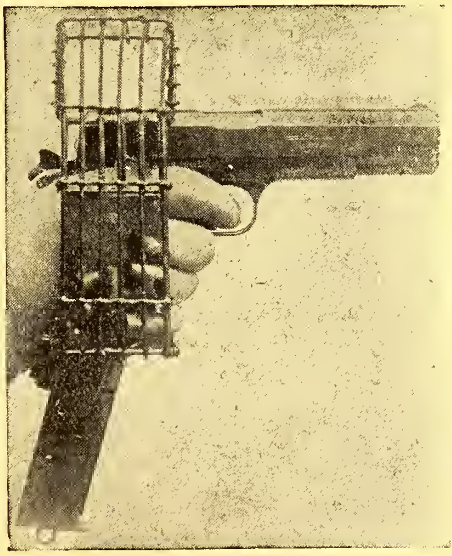

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an air-cooled motor, and so uses less petrol; or, again, unless—to form a rose to the fuselage, anyway—you fit a medallion-shaped or bull-nosed radiator, the head resistance that must be set up by the radiators, where they are bound to be placed to do their work, is going to be terrible.

At 50 m.p.h. only it will be well over 12 lbs. per square foot, increasing to nearly 28 lbs. at a mere 75; while at 100 miles, it is just short of 50 lbs

Taking the middle speed as about as fast as your outlander would need to travel; that is worth anything from 5 to 10 per cent. of the motor's developed power, wasted on overcoming this head-resistance. Obviously, then, cutting it out with an air-cooled motor, we can manage the same mileage with that percentage less power. Saving that power, we clearly gain in mileage—our chief object—on the given amount of petrol. Quite irrespective of any comparative consumption efficiencies per h.p., as exemplified in the case of the Kemp.

Then, there is the weight of the radiators and the connections—allowing jackets to weigh no more than cooling-fins and air-shrouds—also, of the water. Taking this last as three-tenths heavier than petrol at 64 deg. Baumé, or .705 sp.g., it is plain that, for every seven gallons of water, one can carry ten of petrol, or nearly half as much again. At a fair average, we may surely call radiator weight as much more. Knock off something, on the other hand, for increased size and head-resistance of the petrol tank, and still we should come out (on the average combined weight of water and radiators as to original petrol-carrying capacity, and adding our 5 per cent. for head-resistance saved) with a clear gain of 25 to 30 per cent. in petrol, and, therefore, in mileage-efficiency.

CLAIMS AND REALITIES.

Still, it is as well not to claim too much, lest some obscure person in your audience might happen to know something about the petroleum business. For the Kemp claim, in short—as a reason for the consumption efficiency they allege—is that whereas the water-cooled cylinder has a temperature of less than 212 deg. F., or boiling point of water, laboratory tests have shown that the most efficient temperature to ignite a charge of aeromotor petrol-mixture, is 350 deg. to 375 deg F.

Which is either sheer nonsense—that anyway—or a frigid and calculated confusion of the issues. In the first place, any straight-run petrol at 64 deg. Baumè sp.g. starts to gasify well below 60 deg. F., and is all over at 200 deg. F. Secondly, by the time any water in the jacket is anywhere near 212 deg., the temperature *inside the cylinder,* after the first dozen pops, will be well up to 350 deg. F., or quite as high as inside any air-cooled cylinder. While, when either motor is "batting its full"—did you ever, through the clear quartz spyhole of any patent plug, see that greenish-white flame of the Pit?

No, the real reason is that the air-cooled motor, radiating good B.T.U.'s faster, because it has to, immediately thins, and, therefore, repels the charge entry far more strongly than the cooler-headed externally-water-cooled one. Hence, very probably, the economy gain.

SOME PHYSICAL REASONS.

But it is also the precise reason why, on these average four-inch, five-inch dimensions for each, you can never get more than 10 h.p. per cylinder out of your air-cooled motor, do what you will. Raise the compression and m.e.p. you dare not, lest she pre-ignites. Perhaps a whole inch or two longer stroke may give you an extra five, six, or seven h.p. all told. But whirl up her r.p.m. to two thousand or better, the odds are she will give you rather less than normal. An excellent Kemp motive—apart from greater durability or propeller efficiencies—for keeping the r.p.m. down to 1,150! But—all these little variations are known, notable and assured ways of increasing the h.p output of a water-cooled motor. As witness track and road-racing results: from the "Four-inch" to any Coupe de l'Auto.

Yet, says someone, since the good reliable air-cooled motor is so very good and reliable, even through the hobs of the Mojave and greater deserts. on your own argument such a commercial proposition, why not materially increase your cylinder dimensions? For two reasons at least. The obvious mechanical one is that it would mean such a widening of cooling-fins that the motor would be inconveniently long, as well as bulky. The physical one is that such factors as molecular cohesion, metallic fatigue and the power of resistance thereof, and twenty other obscurities, remain practically constants within very narrow margins of alteration.

They tend to worsen under applied heat, anyway—which really only brings about a slight loosening of molecular cohesion, the first touch of the earliest move towards ultimate gasification if you applied heat enough—and play you never so wisely - with curious alloy metals, tungsten, vanadium, even the wondrous molybdenum, you cannot greatly increase those margins to respond to, or cope with, the enormously disproportionate heat increases, the longer *aggregate* of thermal units that you should inevitably get—and be thus unable to get rid of by radiating the excess—by any material increase of cylinder dimensions.

That, incidentally, is the reason I have been looking for those

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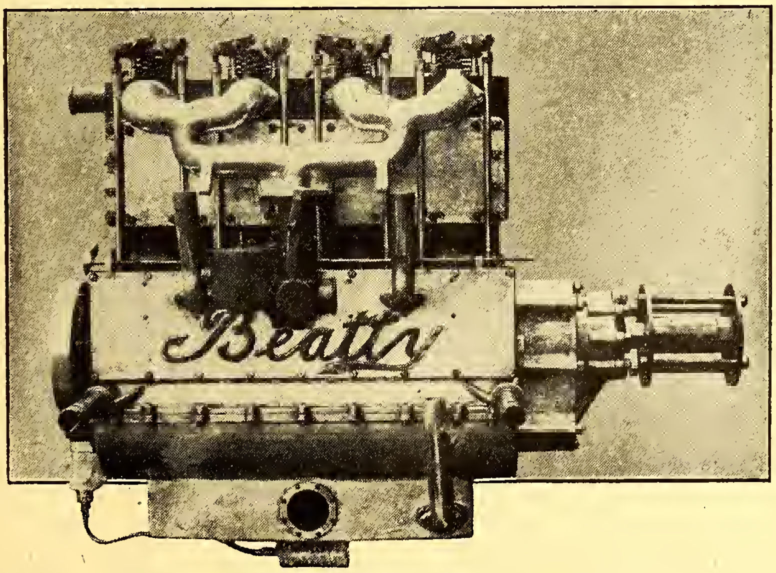

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many years mainly, in all the learned society papers and articles. It is evidently one of the deepest secrets of the motor trade, so don't give it away. Because, it is also one of the chief reasons why the L. C. motor is such a hyperæmic freak.

However, reverting to the particular Kemp proposition, they certainly have grasped the fact that a water-cooled motor is indirectly an air-cooled one, and have missed the point that this very indirect cooling enables its greater latent possibilities of efficiency, physical and mechanical, to be taken advantage of by remote, non-local radiation; and in a manner obviously impossible locally—unless by the Lahaussois device—whereas the very directness of the air-cooled motor's radiation defeats that aim. Hence, again, the limitations of power-increase of the air-cooled class.

They have also grasped this, that the "secret of properly cooling an air-cooled cylinder lies in the scientific construction of the radiating-fins, not wholly in the amount of radiating surface, or the amount of air that passes through and about that surface." So they will not mind sharing it with Renaults, De Dion, the brothers Séguin, MM. Esnault-Pelterie, Farcot, Clerget, and others right back to Ferdinand Forest. Tatler that I am, I believe I gave it away in these columns ever so long ago.

The Real Kemp Triumph.

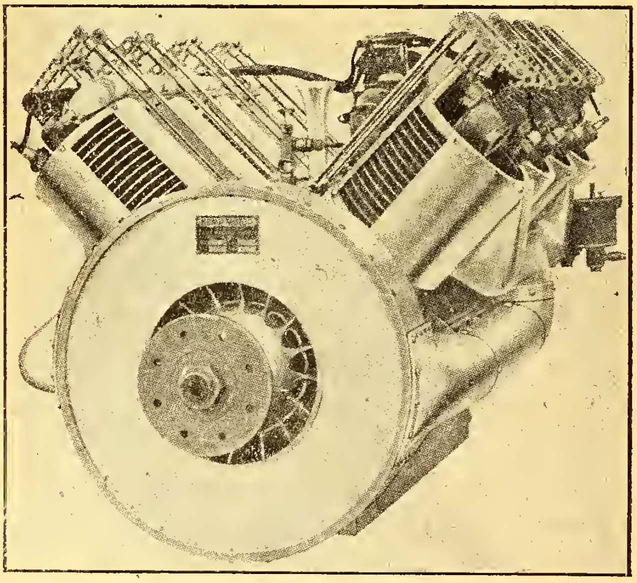
But their latter statement almost contradicts the far, far better thing that they have done, than any of these. Recognising the remarkable results those others, nevertheless, obtained, although their *mécanique* was inefficient in proportion to the air volume dealt with by the blower, the Kemp people went at once for, and succeeded in designing, an obviously more effective system than anyone else's. They saw—what the others missed or fumbled at—that even distribution of air to and around each cylinder is as essentially important as even carburation or lubrication; both of which, by the way, it naturally assists.

So, having mounted a numerously-vaned blower-fan on the crank-shaft end of the V type model, they—as the illustration shows—connected its drum to two sheet metal manifolds, branched evenly right and left, leading into the cylinder jackets, or air-shrouds, between each pair. And as to these air-shrouds—going further than the Renault baffle-plates, or their brazen R.A.F. imitation—they saw to it that the shrouding so closely surrounded the entire series of fins on each cylinder, that the air was bound to flow evenly all round, while providing an ample escape. Thus, with an unwasted and actually smaller volume of air driven with greater velocity, they likewise were assured of an absolutely uniform cooling of all eight cylinders, and a uniform expansion. Withal, it did not matter on which end of the crank-shaft—it does in the Renault and De Dion—the blower was mounted; the effect was bound to be the same.

Furthermore, so long as an ample air opening was left for the main entry to the blower, and another at any convenient point for the heated air to escape, the whole power-outfit might now be enclosed in the hull of a flying-boat, or within the fore-body of a fuselage. Which possibility and the consequent one of being able to armour the entire motor if desired is obviously out of the question with the others.

Thus, simply by a more thorough study of the one neglected or half-done thing, have the Kemp Machine Company increased the reliability factor of their air-cooled motor, one might truly say, a hundred per cent. above the rest.

(*To be continued.*)



End View of the Kemp Engine.

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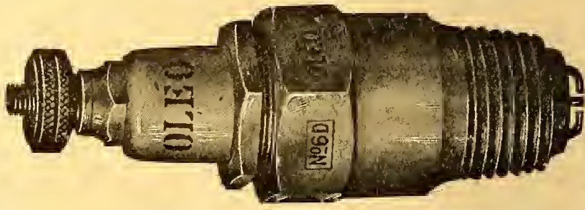

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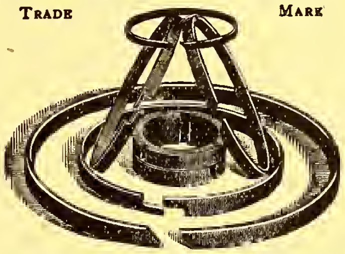

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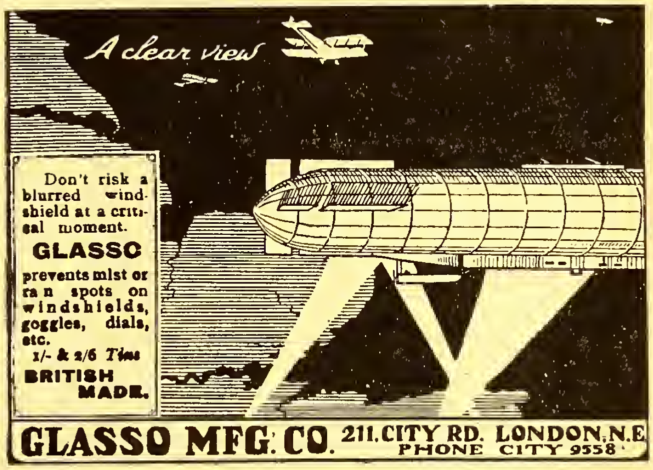

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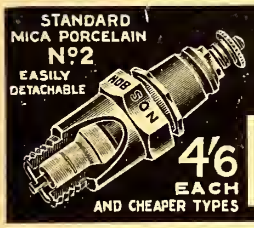

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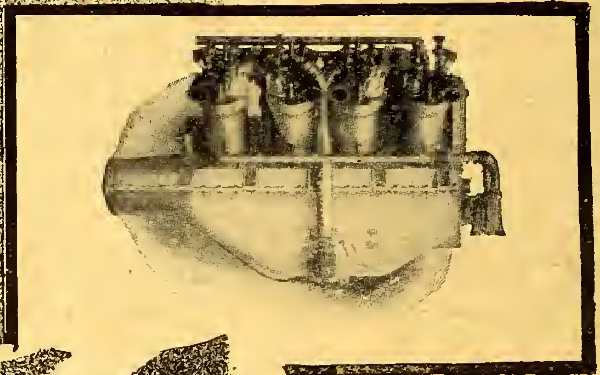

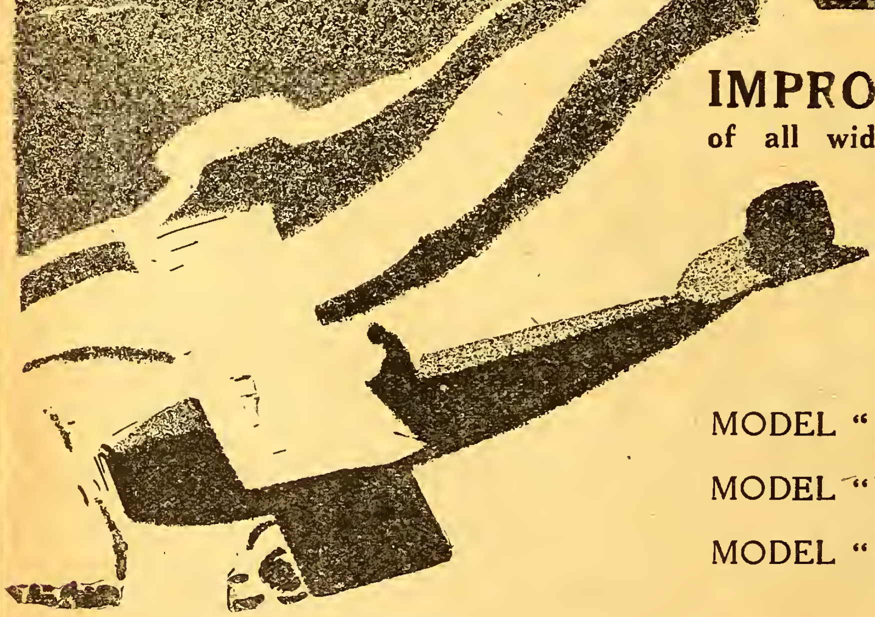

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THE HISTORY OF AERONAUTICS IN 1916.

(*Continued from* The Aeroplane *of January* 3.)

The second half of the year was notable for the growing dominance of the Allies on the Western Front. At times—at any rate from June to October—the R.F.C. held absolute supremacy in the air, and the French also showed marked advance.

The comparative figures of losses published month by month are merely of interest, and must not be taken as in any way accurate. Both sides claim as victims machines which have been seen to descend after a fight, and it is quite probable that in many cases the pilots of these machines have merely dived to escape, or have landed because of engine stoppage, or because they were short of ammunition or petrol.

It is even unsafe to reckon as a casualty a machine which has been seen to fall absolutely out of control, for the very good reason that, if a pilot wishes to descend vertically, he will, if very skilful, frequently deliberately throw his machine out of control into a spin. In that case, it falls in a series of irregular circles of very small diameter, and almost vertically from where he started; whereas, if he endeavours to dive, the wings of the machine will lift it horizontally across the country, although the machine may be standing absolutely on its nose. That is to say, the machine, if dived vertically, will "climb" horizontally along a vertical path, the climb being accentuated by the fact that it is not hindered by gravity, and is aided by the speed given to the machine vertically by gravity being greater than the speed that its engine would have given it if flying along horizontally.

For these reasons, no machine can really be counted as brought down unless it is actually seen to be a wreck on the ground.

It must also be remembered that the German claims for victims include all Allied machines, and, owing to the bad equipment and organisation of the Russian Air Service, there must be quite a large number of Russian machines brought down which are claimed by the Germans and are not admitted by the Russians.

The losses of the Italian Air Service, though apparently small in number, must also be added to the German claims, and, therefore, it would be foolish to sneer at the German figures, as a good many people do, though at the same time it is probable that they are far from accurate, simply owing to the victims being claimed on the lines indicated above.

In this history no account has been taken of the various raids by enemy aircraft on this country. A complete list of such raids since the beginning of the war will be found in their proper sequence at the end of the historical section.

The crowning event of the year's work was, of course, the fall of the Asquith Cabinet and the appointment of a new Cabinet, which proceeded to set to work energetically to reorganise the whole question of aircraft output, and the prospects for the coming year are, therefore, particularly bright.

JULY.

Naval.—An interesting example of British official methods appeared on July 5th when The Aeroplane published a couple of photographs of the small Naval "S.S." airships commonly known as "Blimps." These photographs had already appeared a month or so earlier in an American paper, and, consequently, were in Germany before they appeared in England.

A week or so later an account appeared, also taken from an American paper, of a triplane alleged to be in the possession of the British Government with a span of 135 feet, and fitted with four 350 h.p. motors. Mr. McCulla, of the Packard Company, an American motor firm, who was responsible for this description, stated that he had made a trip of 450 miles in this machine at the request of Commander Briggs. Though the description was not strictly accurate, it was calculated to give the enemy an idea of our lines of development, and it is peculiar that a neutral should be permitted to see so much.

The Censorship permitted this paper to publish on the 12th an account of a trip by a pilot and 20 passengers on a British aeroplane to a height of 7,000 feet. Even at this date, one cannot, of course, describe the machine, but one may state that it was built by Handley Page, Ltd.

On the 6th Admiral Jellicoe's report on the Jutland battle appeared, in which mention was made of one pilot and observer and seaplane, and of a seaplane-carrier, the "Engadine."

General Monroe's dispatch of the 12th from the Eastern Mediterranean mentioned the names of many R.N.A.S. officers as having done good work in that area.

A curious accident to a Naval pilot occurred on July 20th, when a seaplane performing over Southampton Water low down came round a corner suddenly and hit the mast of a ship, killing both the pilot and passenger.

On the 25th Admiral Bacon, commanding Dover Patrols, issued a dispatch commending the work of aviators in Flanders.

Military.—On the 5th there appeared in this paper Lord Montagu's account of the landing in the German lines of the F.E.2d. fitted with the latest Rolls-Royce engine, owing to the machine having been sent off in charge of a pilot who had never before flown to France, and carrying an officer as passenger who did not belong to the R.F.C., and who had never even been in an aeroplane. Though trivial in itself, this accident apparently caused more doubts about the administration of the R.F.C. than anything else which had become public, and it convinced many people that the critics of the R.F.C. command were not altogether in the wrong.

On the 1st was published General Smuts's dispatch from East Africa, mentioning the good work done by the South African Flying Corps.

A General Headquarters report of the 1st chronicled the entire destruction of a train near Douai by aeroplane bombs from 900 feet.

A G.H.Q. dispatch of the 3rd reported the destruction of 15 German aeroplanes in three days during the Somme battle by the R.F.C.

The "Times" correspondent in France recorded on the 5th the amazing demonstration of our supremacy in the air, and on the 6th a story of an aeroplane machine-gunning German infantry on the march, this being the first public evidence of the improvement which had taken place in the fighting power of the R.F.C. at the front.

The "Daily Mail" on the same day mentioned for the first time the use of rockets for the destruction of enemy kite-balloons, the rockets being discharged eight at a time.

About the 19th it become known that the R.F.C. supply department was at last having aeroplanes of Trade design built by sub-contractors in the manner advocated by this paper many months before. In the same issue of The Aeroplane there appeared for the benefit of the Inquiry Committee an article dealing with many points of the mismanagement of the R.A.F.

On the 13th a question by Mr. Burgoyne in the House of Commons drew attention to the arrest of an R.A.F. workman who had given evidence before the Inquiry Committee, and it has always appeared curious that this particular man should have been prosecuted for malpractices which were then comparatively common in the R.A.F.

About this period numerous letters from the front demonstrated conclusively the superiority of the R.F.C. in the Somme district. One of the most curious quoted a note dropped by a German aviator behind the British lines, and addressed to the R.F.C., saying, "Please give your b—— Flying Corps a rest!"

On the 27th was published the report on the R.A.F. issued by Sir Henry Donaldson, Sir Richard Burbidge, and Sir Charles Parsons, recommending an entire alteration in the management, and condemning the extravagant methods of the establishment. With it was published a report by the Air Board which recommended the appointment of a new Superintendent. Following on this, Temporary Lieut.-Colonel (T.F., temp.) Mervyn O'Gorman, C.B., was appointed to another job, and Mr. Henry Fowler, of the Ministry of Munitions, formerly Chief Mechanical Engineer to the Midland Railway, was appointed Superintendent in his stead.

Comparative Losses.—The British admitted the loss of 51 machines in fights, and 28 shot down. Total, 79. The Germans admitted the loss of 17 machines in fights, one shot down, one missing. Total, 19. The Allies claimed 50 Germans brought down in fights, and 36 shot down. Total, 86. The Germans claimed 59 Allies brought down in fights, 15 shot down, six forced to land, and one caught when landing a spy. Total, 81. 48 claimed to be in their hands.

Foreign.—A French communiqué of July 3rd stated that 13 German kite-balloons had been set on fire in one day by French aeroplanes during the artillery preparation on the Somme.

An article in the "Times" on the 13th recorded the use of "infantry aeroplanes" at the front in conjunction with a creeping barrage fire over advancing infantry. One gathers from British infantry officers who went through the Push at this date that this system of attack was actually invented by the British Army.

On July 26th there appeared an account of a notable flight made by Sous-Lieut. Marchal, who left Nancy on July 20th at 9.30 p.m., flew over Berlin dropping pamphlets to show what might have been done by bomb-droppers, and landed, owing to plug trouble, at Cholm in Poland at 8.30 next morning at a point only 60 miles short of the Russian lines. The distance he covered was something just over 800 miles.

About the 10th a Munich paper recorded that a British pilot had dropped into the German lines on June 30th a wreath to be placed on the tomb of the late Lieut. Immelmann.

On the 12th there appeared in this paper an account from a neutral source of various German anti-aircraft guns, stating that Krupps made a 71 m.m. (2¾ inch) gun, which carried to 20,000 feet. Also an 88 m.m. (3½ inch) throwing a 21 lb. shell, and a 105 m.m. (4⅛ inch) throwing a 35 lb. shell. Also that Erhardt's were making a 65 m.m. (2½ inch), which could throw a shell up to 32,000 feet.

On the 16th an Amsterdam telegram recorded that a German airship had paid a visit to Constantinople.

On the 27th a Zeppelin made a raid on the coast of Finland.

A report from Greece stated that on the 3rd Sous-Lieut. Louis Noel, with a passenger on board, had dropped bombs on Sofia.

In the United States it was made known during the month that the Thomas Aeroplane Corporation had been formed with a capital of 1,000,000 dollars.

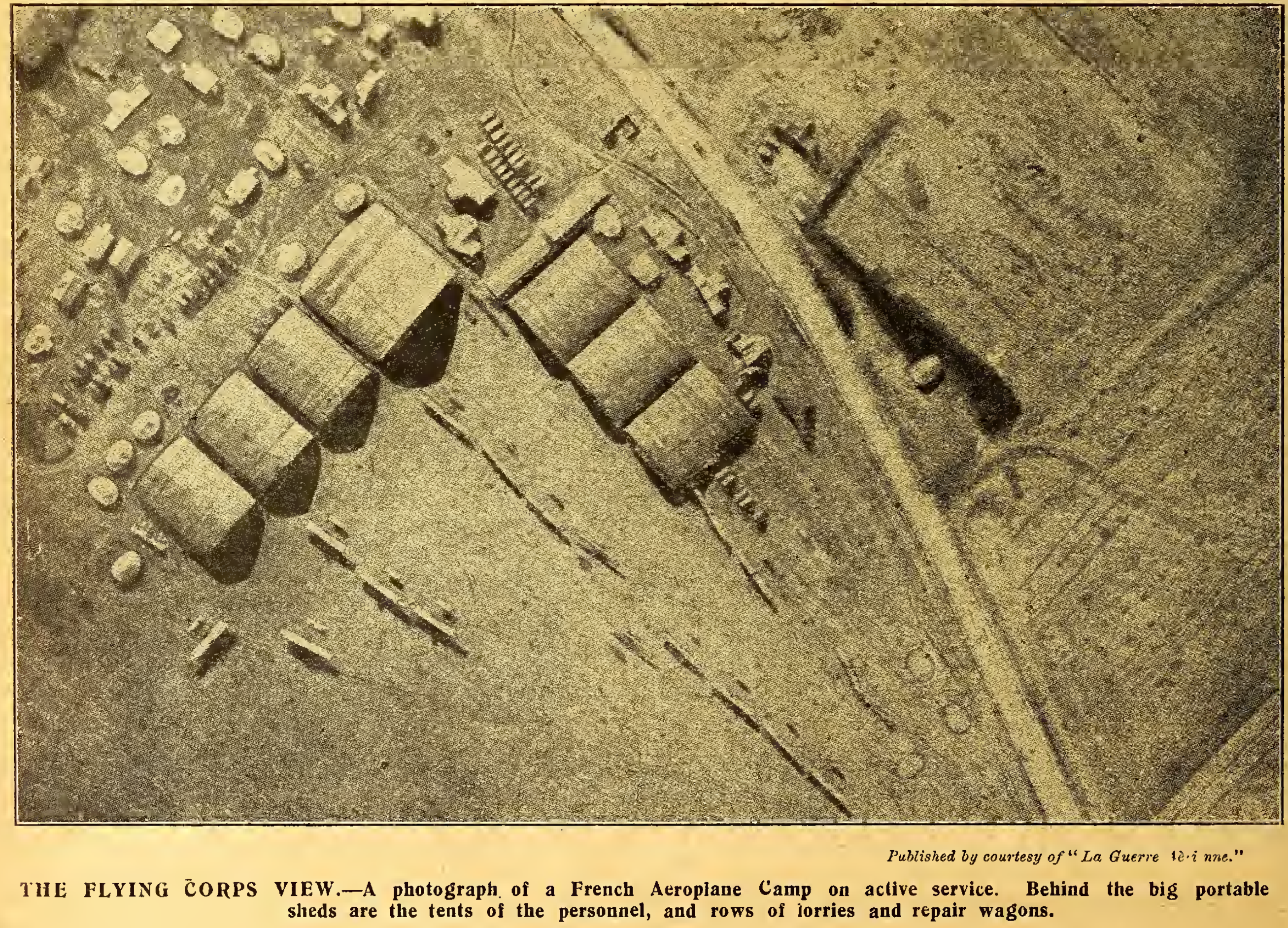
On the 26th this paper recorded the issue of the first annual report of the United States National Advisory Committee for Aeronautics, and also gave an account of the difficulties of aeroplane operations in Mexico.

In Canada it became known that the Polson Iron Works had produced a steel-built war aeroplane, with a climb of 1,000 feet in 1 minute 20 secs., and a speed of 85 m.p.h. with a Sturtevant engine.

A report from New York stated that the Canadian Curtiss Company had formed a flying school for British pilots at Toronto, Canada, and another at Bermuda.

It was recorded on the 12th that on May 22nd the Legislative Council of New Zealand had suggested that the Government should establish an Aviation Corps.

In the Far East it was recorded on the 19th that Japan now had a Naval Aircraft Corps and an Army Aircraft Battalion, and that the Japanese Army had built itself a biplane which was a copy of an L.V.G., and an engine which was a copy of the Mercédès, the building being done at Takarozawa.



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THE FLYING CORPS VIEW.—A photograph of a French Aeroplane Camp on active service. Behind the big portable sheds are the tents of the personnel, and rows of lorries and repair wagons.

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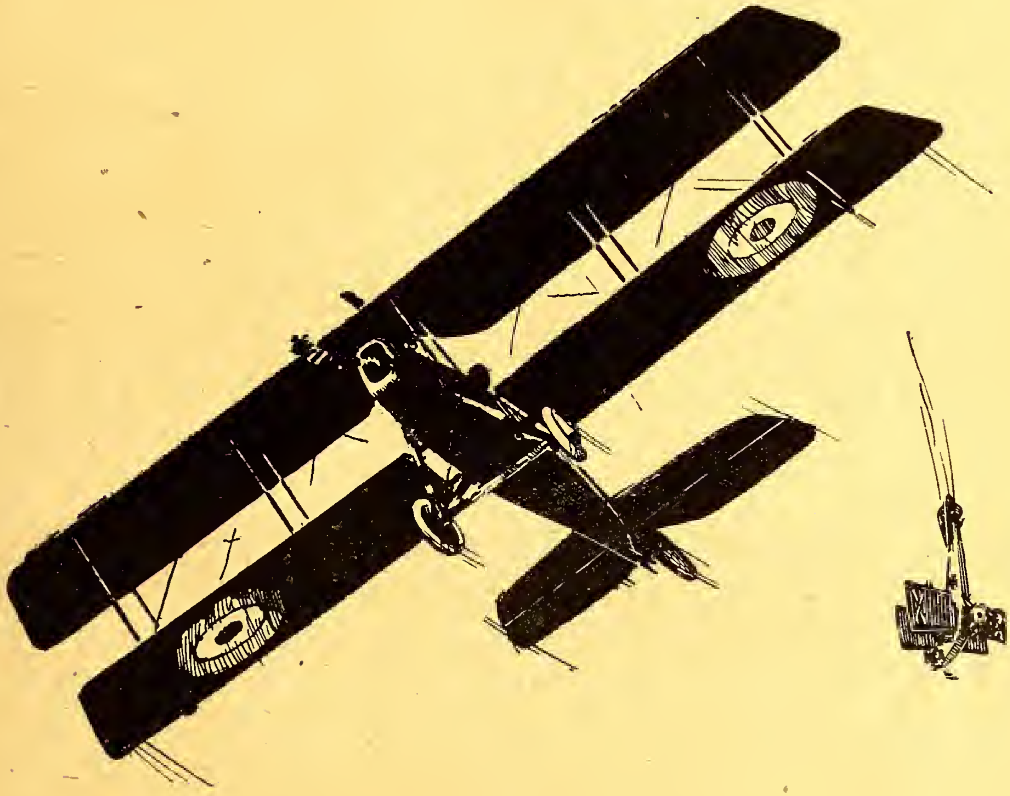

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THE present Weekly Stock Card will be replaced, during this month, by a Weekly House Journal—"AIRCRAFT SUPPLIES"—which will contain in every issue, in addition to Current Prices and particulars of Parts in Stock and expected, a short article dealing with a topic of interest to Aircraft Constructors. We shall issue with this from time to time new Loose Leaf Sheets for insertion in the Cover-Binder referred to above. This little Journal will be a frank endeavour to interest manufacturers in the business of this Company, and to further the proposal for the Standardisation of Aircraft Parts.

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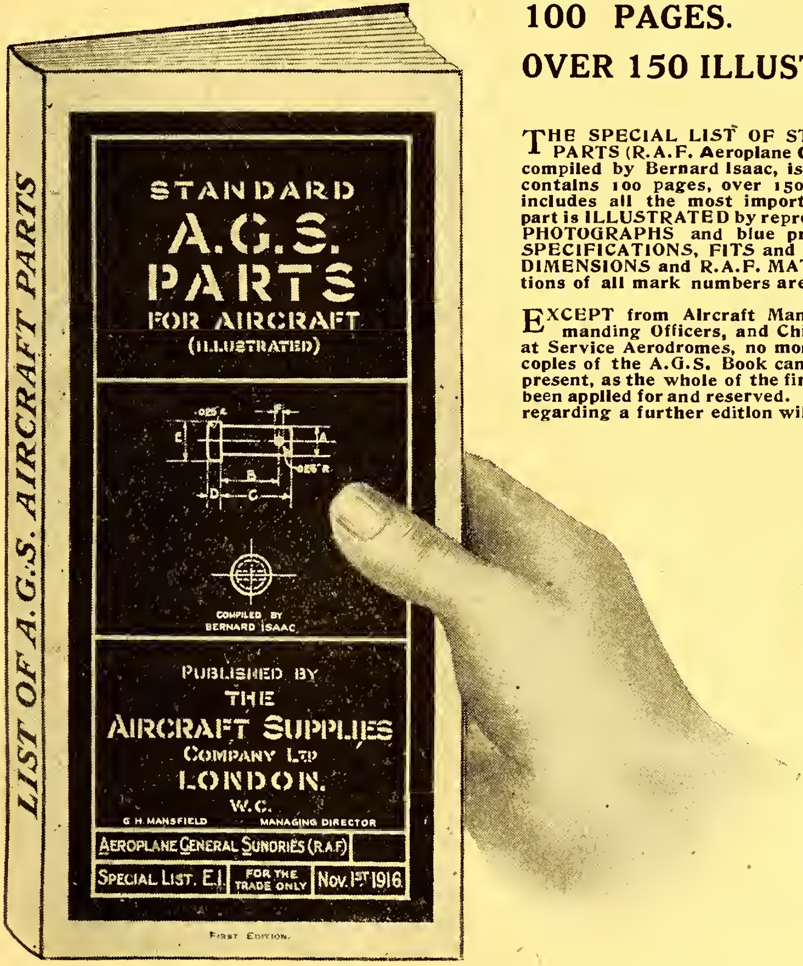

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THE present Weekly Stock Card will be replaced, during this month, by a Weekly House Journal—"AIRCRAFT SUPPLIES"—which will contain in every issue, in addition to Correct Prices and particulars of Parts in Stock and expected, a short article dealing with a topic of interest to Aircraft Constructors. We shall issue with this from time to time new Loose Leaf Sheets for insertion in the Cover-Binder referred to above. This little Journal will be a frank endeavour to interest manufacturers in the business of this Company and to further the proposal for the Standardisation of Aircraft Parts.

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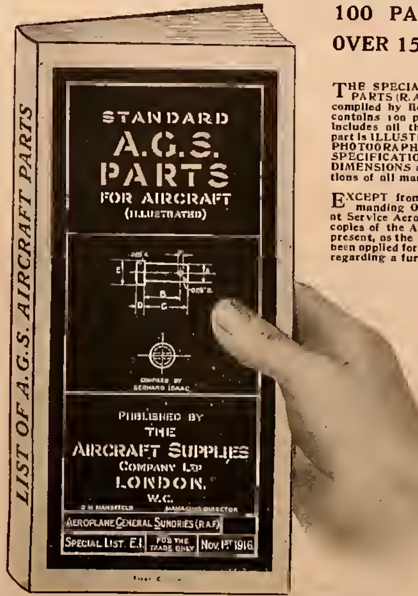

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EXCEPT from Aircraft Manufacturers, Commanding Officers, and Chief Stores Officers at Service Aerodromes, no more applications for copies of the A.G.S. Book can be dealt with at present, as the whole of the first edition has now been applied for and reserved. An announcement regarding a further edition will be made shortly.

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It was also recorded that the Chinese Government had a school at work at Nanyuan, training 40 Naval pupils.

Home Affairs.—An Air Board report published on the 5th described the death of Lieut. Immelmann, the German "star turn," on June 18th.

On the 12th it was recorded that Lord Curzon had been invited to become a member of the War Committee.

On the 26th this paper published a list of 50 pioneers of British aviation, as the result of a suggestion in the "Observer" that the pioneers of aviation should be officially recognised.

An extraordinary general meeting of the Royal Aero Club held on the 27th decided to raise the subscription to £5 5s., and to move into more commodious premises. It was also decided at the meeting that the Club did not require an official organ. The Club actually moved its premises at the beginning of the New Year, and raised its subscription, but the Committee appear at the end of the year to have forgotten the other injunction of the meeting.

AUGUST.

Naval.—On the 5th an interesting experiment was made by Lieut.-Col. Sir Bryan Leighton, Bart., who descended by parachute from a naval airship manœuvring over the South coast.

An Admiralty communiqué of the 9th recorded a raid by British aeroplanes on Mülheim, in Germany. This was the first information of a British naval force in Eastern France. Only a small proportion of British machines took part in this raid in conjunction with many French machines, and it is to be noted that it took place a mere matter of 20 months after the Friedrichshafen raid.

On the 23rd this paper published an Air Board report describing particularly good work by the R.N.A.S. in Southern Bulgaria and in Flanders.

An Admiralty communiqué of the 26th reported a raid by Naval aeroplanes on airship sheds near Namur, quite a good cross-country flight.

Military.—On the 7th there appeared a very graphic description by Mr. W. T. Massey of an attack by Lieut. Slessor, R.F.C., on the cavalry and bodyguard of Ali Dinar, Sultan of Darfur, in the battle of El Fasher.

A G.H.Q. communiqué of the 11th recorded a raid by the R.F.C. on the Zeppelin sheds at Brussels, a fact which naturally prompted inquiries as to why the R.F.C. need do this work when there was a large R.N.A.S. detachment at least as near to Brussels, and taking no part in military operations.

A G.H.Q. communiqué of the 28th reported an unusual incident, in which a heavy storm overtook eight of our machines over the enemy lines, with the result that five of them failed to return.

Foreign.—The Russian correspondent of the "Times" published an article on the 3rd complaining of German aeroplanes bombing hospitals and ambulances, and machine-gunning the retreating populace behind the Russian lines.

About this period there were continual reports of German aeroplanes bombing the harbour of Reval and Russian ports on the Gulf of Riga. There were also occasionally accounts of retaliatory raids on the German seaplane station on Lake Angern.

Roumania's entry into the war during the month gave rise to hopes of considerable additions to the Allies' air forces, but it turned out afterwards that although the Roumanian aviators had been very good, the Roumanian Aviation Service had been badly neglected during the last few years.

On the 29th bombs were dropped on Bukarest by a Zeppelin. This was the first bombardment of the capital, and bombardments continued almost daily thereafter, either by airships or aeroplanes, even the airships coming over in broad daylight.

From Italy it was recorded on the 16th that a civilian flying school had been instituted at Rome for the training as aviators of young men of 18, 19, and 20 years of age who were expected to be called up. The Italians noted about this period a remarkable increase in the number of seaplanes used by the Austrians in raids.

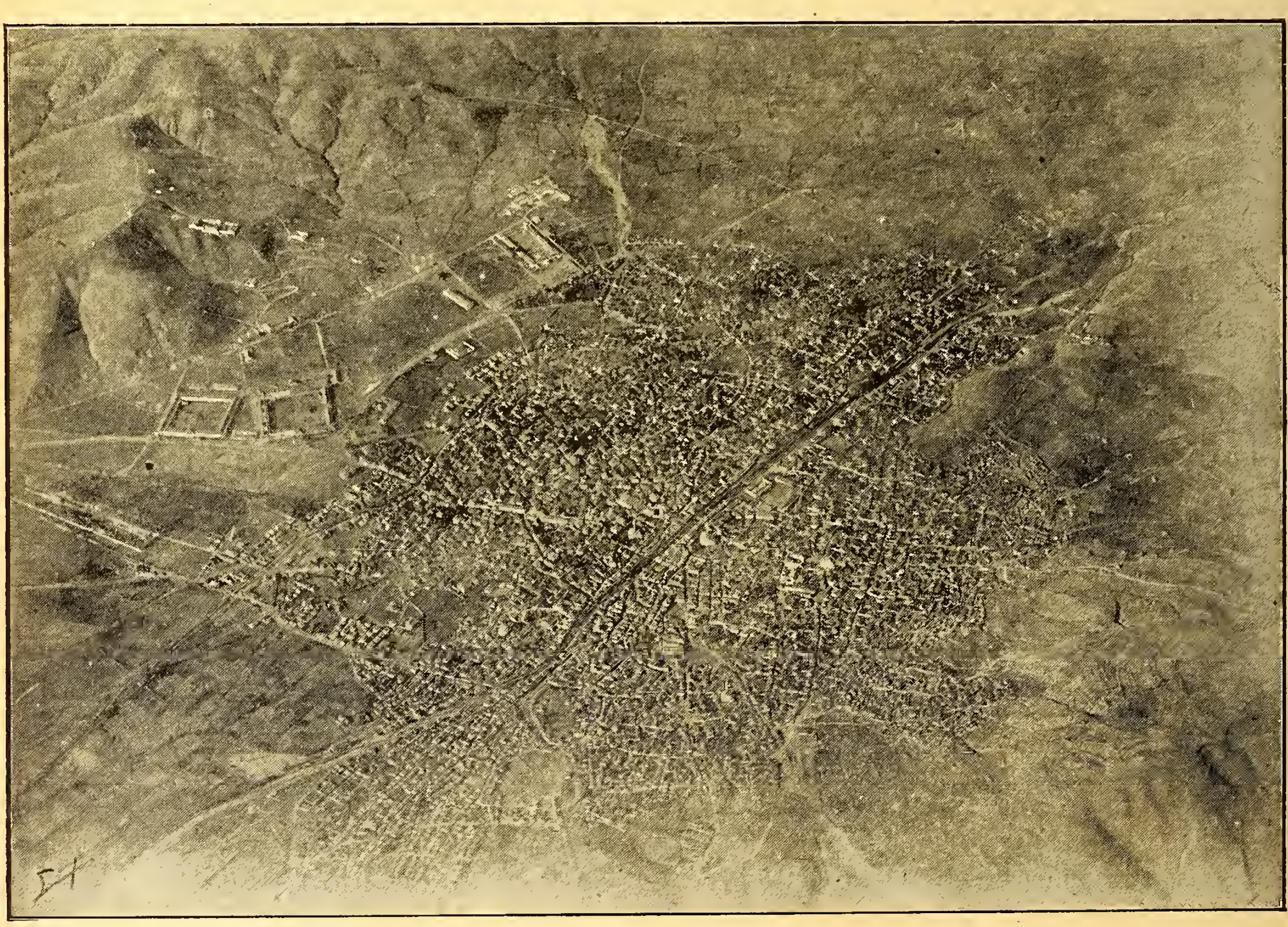
In the United States the Wright Company and the Glenn L. Martin Company joined forces and formed one of the strongest aircraft combinations in the world.

On the 25th Victor Carlström beat the seaplane duration and distance records by flying 641 miles in 8 hours and 41 minutes on a twin-engined Curtiss.

On the 30th it was recorded that the United States Government had allotted 17,000,000 dollars for aeronautics. Of this sum 13,280,000 dollars were allotted to the army.

Home Affairs.—In the House of Lords on August 1st, Lord Montagu attacked the R.A.F. again.

On the same day Mr. Pemberton-Billing asked whether the report of an inspector of the Ministry of Munitions on the waste caused by the manufacture of the R.A.F. engine would be laid on the table. In the following debate he said that the Government were using the House "as a megaphone to shout statements to the public, which before very long are found to have no foundation in fact." He strongly advocated again the use of the R.N.A.S.



THE FLYING CORPS VIEW.—A French photograph of Monastir, taken from the North-East, while it was occupied by the Bulgars. In the left top corner are seen the barracks, past which, towards the left, runs the southward road to Salonika. The road towards the left bottom corner later turns sharp to the left, round the mountains, and northward to Prilep and Belgrade. The road to the right, which actually points North-West, runs towards the Albanian Mountains.

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in retaliatory raids. Mr. Ashley and Mr. Shirley Benn both complained of laxness in organising against Zeppelin raids.

The Annual Report of the Government Advisory Committee for Aeronautics was printed in this paper on the 16th, and consisted of the usual laudation of the clique which was then responsible for the R.A.F. and the N.P.L. Explanatory comments were interpolated in the report in this paper.

The Interim Report of the Judicial Committee appointed to inquire into the administration of the R.F.C. appeared in this paper on the 23rd. This report dealt exclusively with the so-called "murder charges" made by Mr. Pemberton-Billing, and it was evident that the Committee had not had a sufficiency of evidence before them on several of the cases on which they gave a verdict.

On the 16th the Parliamentary Air Committee, of which Mr. Ashley is chairman, visited Farnborough, and several members made flights on Government machines. Fortunately no accidents happened, more by good luck than by judgment on the part of some of the pilots.

On the 22nd Mr. Pemberton-Billing read in the House of Commons a report by an official of the Ministry of Munitions on the ill-effect of making R.A.F. engines at the Austin works. He stated that up to making the 240th R.A.F. engine 4,000 parts had to be scrapped.

He also drew attention to the fact that another department of the R.F.C. which had access to all drawings of all the engine people in this country was turning out their own type of engine. It is of interest to note that this engine appeared not long afterwards, having been actually manufactured by a motor firm. It gave astonishing results on test in the air, but developed some curious defect which led to it being withdrawn from service for some considerable time.

SEPTEMBER.

Naval.—Landships, commonly called "Tanks," first came into action at the taking of Flers and Martinpuich on the 16th. These vehicles were originally the production of the officers of the Naval Air Service, and might easily have been in action early in 1915, having been introduced to the Air Department in 1914, a few weeks after the outbreak of war.

On the 15th an Admiralty communiqué gave an account of good work by Naval land machines in Bulgaria, and another communiqué of the 17th recorded a good flight by a seaplane to bomb a town in Palestine, 45 miles from the coast. The seaplane had to cross mountains a few thousand feet high on its outward journey, which makes the performance more remarkable in view of the species of seaplane supplied to the R.N.A.S.

On the 22nd the Ministry of Munitions issued a notice to the Press giving credit for the "Tanks" to the Air Department at the Admiralty.

Military.—On the 3rd a Schütte-Lanz airship (L.21) was brought down at Cuffley by an R.F.C. pilot, Lieut. Robinson, by a curious stroke of luck in the constituency of Mr. Pemberton-Billing, M.P. for East Herts, to whom was largely due the hastening of preparations for anti-aircraft defence. Officialdom surpassed itself on this occasion by announcing that "the large amount of wood employed in the frame-work of the Zeppelin is startling, and would seem to point to a shortage of aluminium in Germany"! The responsible official apparently ignored the fact that the Schütte-Lanz is habitually built of wood.

On the 20th an article in this paper drew attention to the wrongness of the methods of reporting R.F.C. casualties, in that officers killed on active service at home were, and are, ignored, as also are officers wounded abroad who may die later at home, their relations being thus deprived of the partial consolation of the names of the dead officers appearing in the Nation's Roll of Honour.

A G.H.Q. communiqué of the 15th drew attention for the first time officially to aeroplanes co-operating with infantry.

On the 13th His Majesty the King visited the R.F.C. training-centre at Oxford.

On the 22nd it was officially announced that Mr. Henry Fowler, who had done work of high value in the Ministry of Munitions, and who was formerly Chief Mechanical Engineer to the Midland Railway, had been appointed Superintendent of the R.A.F. vice Lieut.-Col. O'Gorman (T.F., Temp.).

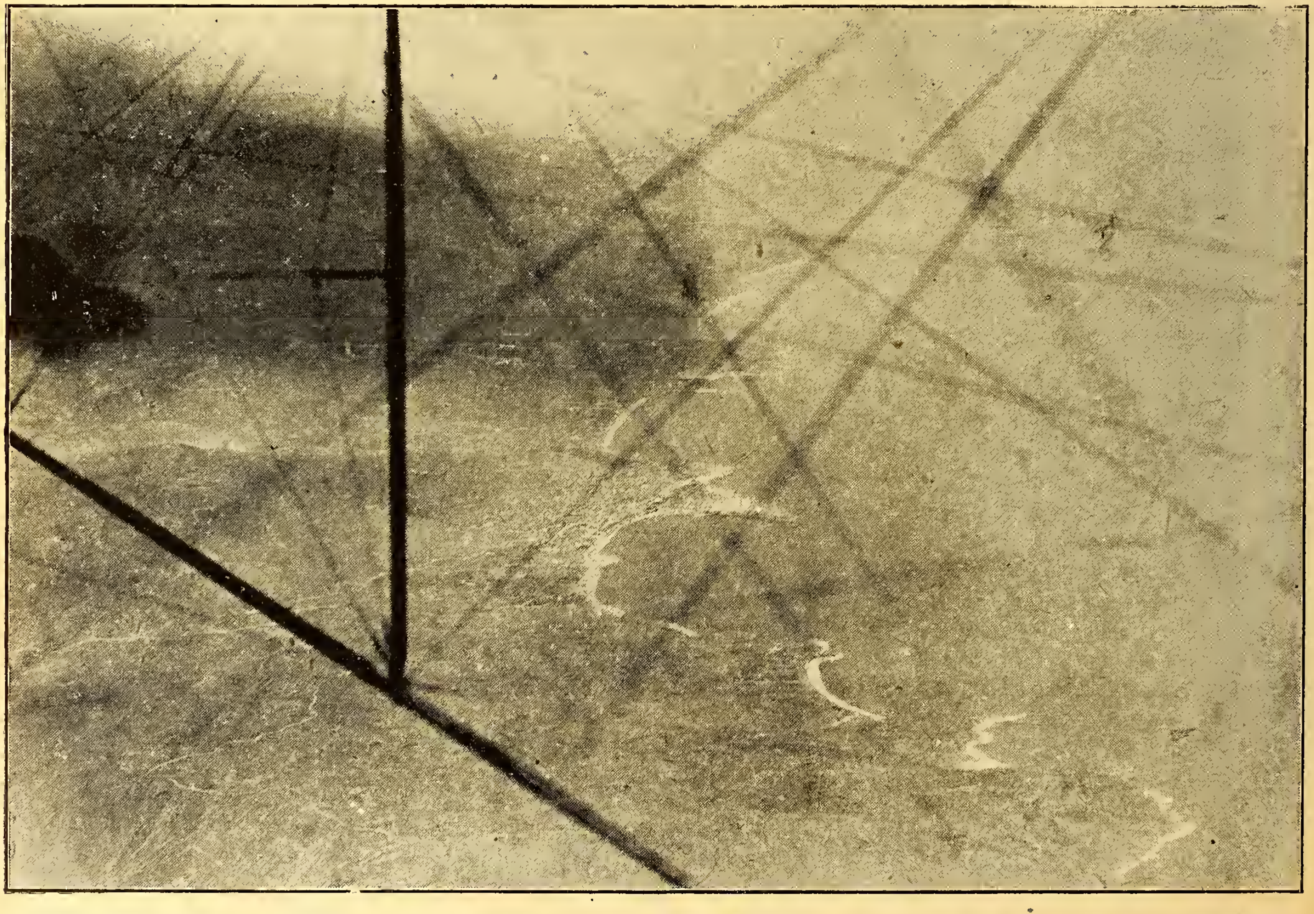
On the 25th was published Sir Archibald Murray's dispatch from Egypt, giving credit to the R.F.C. for distinguished service.

On the 23rd a G.H.Q. communiqué recorded a raid by 50 British aeroplanes at once on German lines of communication, this being the greatest number yet sent out by a solely British force. On the same day the "Morning Post" quoted interviews with German officer prisoners admitting the superiority of the R.F.C.

On the 24th two German airships, L.32 and L.33, were brought down in Essex, either by the R.F.C. or by anti-aircraft guns.

During September the R.F.C. took control of the majority of civilian flying schools, with markedly good results both for the schools and for the output of pilots.

Comparative Losses.—The British claimed 53 German machines destroyed, and 47 forced down during September. Total 100. The British admitted 48 machines lost. The French claimed 100 Germans brought down and 6 forced to land. They admitted



THE FLYING CORPS VIEW.—A French photograph of the Port of Kavalla, occupied by the Bulgars, at which the Embassies of the Central Powers were landed after their expulsion from Athens (vide Admiralty Communiqué of Jan. 3rd).

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no losses. The Germans admitted losing 20 machines in fights and 1 missing, and claimed 97 brought down in fights, 25 by anti-aircraft guns, and 7 forced landings. Total 129, half of which were claimed to be within the German lines.

Foreign.—On the 14th 18 Caproni three-engined machines of between 300 and 500 h.p. apiece raided Trieste. This was the largest raid yet noted as being composed entirely of big machines.

On the 16th 4 French aeroplanes left Salonika for Rumania, via Sofia. The leading machine, piloted by Sous-Lieut. Louis Noel, with Lieut. Lesueur as passenger, did the flight to Bukarest without a stop in 5 hours.

On the 22nd Adjudant Baron, accompanied by a passenger, bombed Ludwigshafen, near Mannheim, the former place being 100 miles from the French frontier.

On the 24th Capt. de Beauchamp and Lieut. Daucourt, each alone on a Sopwith biplane, dropped bombs on Essen, the total distance of the journey there and back being 500 miles.

Particularly good work by the American Escadrille in the French service was noted at this time.

A German report of the 28th stated that 15 houses had been destroyed, 13 Belgians killed, and 28 wounded, by a British air raid over Brussels.

On the 25th it was reported from Petrograd that a 4-engined German aeroplane had been seen on the Russian front.

Home Affairs.—On the 27th there appeared in this paper an article on the curious activities of a concern which had adopted the title of "The Aeronautical Institute of Great Britain," and it was pointed out that this affair had not the support of any of those intimately concerned with aeronautical affairs in this country. The concern still seems to be confused by many people with the Aeronautical Society of Great Britain, which is the institution recognised by the Services and the Industry as the representative scientific body on aeronautical affairs.

OCTOBER.

Naval.—The first mention of the R.N.A.S. during the month was on the 13th, when a Franco-British squadron of 40 machines, of which a few were British, bombed the Mauser Works at Oberndorf. One British machine was lost. Apart from this, however, the squadrons in Flanders and elsewhere continued to do good work in spite of drawbacks.

Military.—October 1st was notable for the bringing down of Zeppelin L.31 at Potters Bar by Lieutenant Tempest, R.F.C.

On the 7th newspaper correspondents at the front stated that the dominance of the R.F.C. was never more evident than at that time, and a captured report by General Sixt von Arnim, Commanding 4th German Corps, was published, in which the General demanded more anti-aircraft guns, more kite-balloons, and more aeroplanes.

On the 9th a further newspaper report stated that the German Air Service was showing "uppishness." This was really the beginning of the trouble with the new German fast biplanes, and it was confirmed on the 28th by the "Times" correspondent, who wrote of the Germans showing increasing "temerity" in crossing our lines.

On the 13th a dispatch from General Lake, Commanding in Mesopotamia, mentioned the R.N.A.S. and R.F.C. as "deserving of the highest praise," as they were "subject to attacks by enemy aircraft of superior speed and fighting quality. This dispatch confirmed statements of the same nature published in this paper many months before.

On the 17th Mr. Lloyd George, then Minister of War, announced that R.F.C. officers were not allowed to take money rewards for doing their duty. An order to this effect was issued on the 18th, and so put a stop to the self-advertisement of sundry wealthy people.

On the 19th a further dispatch from General Lake again commended the work of the R.F.C. in Mesopotamia.

On the 19th a G.H.Q. communiqué stated that the weather recently had been unfavourable for aviation, and from that date until well on into December the amount of flying at the front was considerably less, this being due also to the fact that the Somme "push" had also stopped, and there was, therefore, less necessity for aerial operations on a very big scale.

On the 25th Sir Reginald Wingate, Sirdar of the Egyptian Army, issued a dispatch commending the R.F.C. in Darfur.

Comparative Losses.—The Allies claimed to have shot down 104 enemy machines in October. The British admitted the loss of 42 machines. The Germans admitted the loss of only 17 machines, and claimed 83 brought down in air fights, 15 by guns, and six forced landings. Total, 104. The coincidence in the number claimed is remarkable.

Foreign.—On the 10th Adjudant Baron and Adjudant Chazard bombed the Bosch Magneto Works at Stuttgart, 100 miles from the French frontier, and on the 13th a Franco-British squadron, mostly French, bombed the Mauser Works at Oberndorf, 70 miles from the frontier. It was claimed that six German machines were shot down in the course of the raid, and the Germans shot down nine of the Allies' machines. One of these was a British machine, and one of the others was piloted by Adjudant Baron, one of the most noted French raiders, who was killed.

On the 13th, Lord French, Commanding British Home Forces, visited the Paris aerodrome of Le Bourget with General Dubail, Governor of Paris, and studied the French system of aerial defence. One trusts that he also studied the French system of lighting Paris at night.

On the 22nd a French raiding squadron of 24 machines dropped 4,200 kilos (over 4 tons) of bombs on ironworks near Metz. The load per machine is noteworthy.

On the 28th the famous German aviator, Capt. Bölcke, was killed in a collision with another German machine in the course of an air fight with sundry British machines.

On the 7th the "Daily Telegraph's" Petrograd correspondent stated that the Russian Air Service had had great successes. Confirmatory evidence is still lacking.

On the 5th the Australian Minister of Defence announced the formation of another squadron of the Australian Flying Corps, and the dispatch of reinforcements for four other Australian squadrons.

On the 28th a new Australian flying school was opened at Richmond, New South Wales, by the N.S.W. Government.

In the United States the "Popular Mechanics" magazine published a wonderful scheme, alleged to be of German origin, by which an enormous sea-going aeroplane carries on its upper plane a small scout machine intended to be used as an auxiliary destroyer. The idea is noteworthy simply as an historical fact, and not for any future value it may have.

On the 18th this paper published the statement that the United States Navy Bill authorised the construction of four 35-knot scout cruisers of 7,000 tons, fitted with anti-aircraft guns, and each designed to carry four large seaplanes, with launching apparatus.

It was also noted that Lieut. John Towers, late Additional Naval Attaché to the United States Embassy in London, was commanding the chief air station of the United States Navy.

Home Affairs.—On the 4th this paper had the privilege of announcing that the British Wright Company, proprietors of the Wright Patents, had presented the use of those patents to the British Aircraft Industry. That is to say, no action will be taken for previous infringements of the patents, and that no application will be made for their renewal when the original patent lapses in 1917.

It was also made known that the Zeppelin Maybach engines were actually of the same general design as those used in the Mercédès racing cars which won the Grand Prix of 1914, and were quite different from the German aeroplane engines.

On the 11th the question of night-flying was discussed at some length, and suggestions were made which apparently coincided with official views.

On the 25th a strong plea was made for greater intelligence in the use of man-power in the Flying Services, more especially with reference to instruction work.

In the House of Commons on the 13th Mr. Pemberton-Billing drew attention to the evils of "graft" in the output of aircraft and war material generally. On the 17th Col. Norton Griffiths made inquiries about the fate of pilots of British aeroplanes captured by the Germans while in the possession of "tracer" bullets. Curiously enough, nothing further has been heard of this matter, so one assumes that the Germans recognise the use of these bullets in air fighting.

NOVEMBER.

Naval.—On the 10th 17 R.N.A.S. machines operating in Eastern France bombed the works at Volklingen, and dropped about a ton of explosives. This was apparently the first notable activity of this detachment as a separate force.

In the course of the month many raids were made by the R.N.A.S. on German positions along the Belgian coast, obviously as the result of agitations and pertinent questions in the House of Commons and the Press. No satisfactory explanation has ever been given as to why these raids were not maintained during the earlier part of the year.

Military.—A G.H.Q. communiqué of the 10th recorded a battle between 30 British machines and 40 Germans, this being about the biggest air fight over one particular area yet recorded.

On the 17th and 18th G.H.Q. communiqués reported more fighting in the air, and stated that the enemy "showed more enterprise than usual."

On the 14th aeroplanes were used for the first time in Indian warfare in action against the Mohmand tribes on the Afghan frontier. It is said that the moral effect was high.

On the 12th a German aviator from the Arabian frontier of Egypt dropped bombs in Cairo and caused some casualties.

Comparative Losses.—The Germans claimed 71 victims in air fights, 16 by gunfire, and 7 forced landings—94 in all, and they admitted losing 31 machines.

Foreign.—On the 17th Capt. de Beauchamp left Nancy at 8 a.m.

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on a Sopwith biplane, passed over Friedrichshafen, dropped bombs on Munich, crossed the Alps, and landed in Italy, after a flight of 440 miles, at 2.45 p.m.

On the 28th French aviators shot down in Flanders two Germans on an aeroplane carrying a large scale map of London, these being presumably the raiders who dropped bombs on West London.

On the 19th the Russians claimed to have shot down a Zeppelin with 16 passengers. The smallness of the crew leads one to doubt whether the ship was a Zeppelin.

On the 22nd this paper published the prices submitted in tenders by 11 American makers for school machines for the American Government. A comparison of the prices is interesting, as they ranged from £500, minus engine, to £1,800, with engine, for standard 90-h.p. machines.

Home Affairs.—On the 1st the Airship Issue of THE AEROPLANE appeared, containing a large amount of information about airships, and with illustrations from photographs kindly lent by the Admiralty of details of the latest Zeppelins.

It was noted on the 1st that the Ministry of Munitions was establishing training shops for makers of aero-engine parts

On the 8th was discussed the suggestion that tthe Ministry of Munitions might with advantage control the output of aircraft for both Services, in view of the fact that the Ministry already controls labour and material, and that no one in the Ministry was definitely interested in aircraft output, so that supplies were bound to suffer. It now appears that an Air Supply Department at the Ministry will control aircraft output in future.

On the 22nd the latest German aeroplanes, which had recently been giving trouble on the British front, were discussed at some length, and the authorities were warned against the possible repetition of the "Fokker scourge" of a year earlier. Attention was drawn to new dangers of breakages in aeroplanes arising from the enormously powerful engines now used.

It was stated on the 22nd that the Anti-Aircraft Corps was being combed out, and that fit men were to be drafted to the Artillery. In the same issue it was noted that the Field-Marshal Commanding Home Forces had stated that rail and tram traffic was not regarded as being a guide to aircraft.

On the 29th was published a list of French and British machines shot down by the Germans during August and September, a list which apparently conveyed to the relatives of missing officers information which they were unable to obtain from official sources.

In the House of Commons on the 22nd Mr. Joynson-Hicks asked a question about commission of 16 per cent. having been paid on orders amounting to some millions of dollars by an American manufacturing firm, and the Admiralty representative promised a close inquiry into this matter.

On the 29th Dr. Macnamara, on behalf of the Admiralty, stated that 75 per cent. of the personnel of the R.N.A.S. were serving at home, but added that the airships needed a large proportion of men per pilot.

On the 23rd there died Sir George White, founder of the British and Colonial Aeroplane Co., Ltd., one of the great pioneers of British aviation, and the first man of importance in this country to realise the vital necessity of aircraft, as well as their future commercial possibilities.

Sir Hiram Maxim, well known as an inventor in the early days of aviation, died on the 24th.

It was intimated on the 15th that the R.N.A.S. Comforts Fund, which, under the management of Mrs. Sueter, had done so much good work, was now officially registered, and an appeal was made for subscriptions—with good results.

DECEMBER.

Naval.—An Admiralty communiqué of the 16th recorded a raid by R.N.A.S. machines on the bridge at Kuleli Burgas, near Adrianople, on the main line from Constantinople.

Military.—A dispatch from General Murray, Commanding in Egypt, issued on December 1st, commended the work of the R.F.C. Another dispatch from General Milne, Commanding at Salonika, published on the 6th, also commended the work of the R.F.C.

On the 16th a communiqué from Mesopotamia reported renewed activity on the part of the R.F.C. in that country.

A G.H.Q. communiqué of the 21st announced renewed aerial activity after a spell of bad weather.

A dispatch from General Smuts issued on the 20th mentioned the good effect of bomb raids in East Africa.

A long report from Mr. Edmund Candler, published on the 27th, commented on the improvement in the work of the R.F.C. in Mesopotamia with better equipment.

Sir Douglas Haig's final dispatch of the year, issued on the 29th, commended the fine work of the R.F.C., and warned the authorities at home that "*the maintenance of mastery in the air, which is essential, entails a constant and liberal supply of the most up-to-date machines, without which even the most skilful pilots cannot succeed.*"

Foreign.—On the 19th the famous Capt. de Beauchamp was killed in an air fight.

The Paris "Matin" states that 900 enemy aeroplanes have been brought down during the year by the Allies, 450 by the French, and 250 by the British—the rest, presumably, being divided between Italians, Belgians, Russians, and Servians.

Home Affairs.—On the 6th the Asquith Ministry fell, and, together with the rest of His Majesty's Forces, the Flying Services were cheered with the idea that they now stood a chance in the future of being adequately equipped and handled.

On the 18th Sir Geo. Cave announced that an Air Ministry would be formed by the new Cabinet. Up to the end of the year the Air Minister had not been chosen.

On the 20th a notable article appeared in THE AEROPLANE on the subject of standardisation of aircraft parts.

On the 14th a letter appeared in the "Morning Post" pointing out that with the development of aircraft submersible ships of all types would be necessary for use in future wars, both as warships and as carriers.

The most noteworthy event of the last half of the year was the publication of the report of the R.F.C. Judicial Committee appointed to inquire into the administration of the R.F.C. Though carefully worded, so as not to hurt the feelings of those in official positions, the report made it evident that it practically confirmed all the criticisms made by those who agitated for adequate aerial forces during the first three or four months of the war, and it is satisfactory to note that though the report was issued so late, practically all the reforms necessary were carried out many months before.

The long list of honours for both Services issued at the end of December contained the names of a number of officers of both Flying Services. Most of those deserving rewards received them, but it cannot be complained that in this list any undue prominence was given to the Flying Services, which now seem to be taking their proper place in the scheme of the King's Armed Forces.

A Greeting from No. 34 Squadron, R.F.C.

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THE INVASIONS OF ENGLAND.

The following table represents the air raids which have taken place in England since the outbreak of war.

The first air raid on these shores was on Christmas Eve, 1914, when an aeroplane dropped bombs on Dover without causing any loss of life or personal injury. This was followed by an aeroplane which raided the Thames Estuary district on December 25th :—

Date	Raid	Killed.	Injured.
1915.			
Jan. 19	—Yarmouth and District	4	9
Feb. 21	—Colchester	—	—
Apr. 14	—Tyneside	—	2
,, 15	—Lowestoft and East Coast	—	—
,, 16	—Faversham	—	—
,, 29	—Ipswich and Bury St. Edmunds	—	—
May 10	—Southend	1	—
,, 16	—Ramsgate	2	8
,, 27	—Southend	3	—
,, 31	—Outer London	6	—
June 4	—East and S.E. Coasts	24	40
,, 6	—East Coast	5	40
,, 15	—North-East Coast	16	40
July 3	—Harwich	—	—
Aug. 9	—East Coast	15	14
,, 12	— ,,	6	23
,, 17	—Eastern Counties	10	36
Sep. 7	— ,, ,,	13	43
,, 8	—Eastern Counties and London District	20	86
,, 11	—East Coast	—	—
,, 12	— ,,	—	—
,, 13	— ,,	—	—
Oct. 13	—London Area and Eastern Counties	56*	114†
	Total	181	455
Jan. 23	—Seaplanes over the East Coast of Kent	1	6
,, 31	—Zeppelins over Norfolk, Suffolk, Lincolnshire, Leicestershire, Staffordshire and Derbyshire	67	101
Feb. 20	—Seaplanes over Lowestoft and Walmer	1	1
Mar. 1	—Seaplane over South-East Coast	1	—
,, 5	—Zeppelins over Yorkshire, Lincolnshire, Rutland, Huntingdon, Cambridgeshire, Norfolk, Essex, and Kent	18	52
,, 19	—Seaplanes over East Kent—Dover and Ramsgate	9	31
,, 31	—Zeppelins over Eastern Counties and North-East Coast	43	66
April 1	—Zeppelins on the North-East Coast—L.15 brought down in Thames	16	100
	Totals carried forward for all the raids	337	712
1916.			
	Brought forward	337	712
,, 2	—Zeppelins over South-Eastern Counties of Scotland	10	11
,, 4	—Zeppelins over East Coast	—	—
,, 5	—Zeppelins over North-East Coast	1	8
,, 24	—Seaplane over Dover and Deal	—	—
,, 24	—Zeppelins over Norfolk and Suffolk	—	1
,, 25	—Zeppelins over Essex and Kent	—	—
,, 26	—Zeppelins over East Kent Coast	—	—
May 2	—Zeppelins on North-East Coast of England and South-East Coast of Scotland	9	27
,, 3	—Seaplane over Deal	—	1
,, 20	—Seaplane on the East Coast of Kent	1	2
July 29	—Zeppelins over Lincolnshire and Norfolk	—	—
,, 31	—Zeppelin attack on South-Eastern and Eastern Counties	—	—
Aug. 3	—Zeppelins over Eastern and South-Eastern Counties	—	—
,, 9	—Zeppelins on East and North-East Coast	8	17
,, 12	—Seaplanes over Dover	—	7
,, 24	—Airships over N.E. Coast	—	—
,, 25	—Airships over S.E. Coast and London Area	8	36
Sept. 2-3	—Airships over Eastern Counties and London by large number of airships. Schütte-Lanz L.21 brought down at Cuffley	2	11
,, 22	—German seaplane dropped three bombs at Dover	—	—
,, 23-24	—Airship attack on Lincolnshire, Eastern Counties and London by 14 or 15 airships. Two Zeppelins destroyed. L.33 in Essex and L.32 near coast of Essex. Crew captured.	38	125
,, 25-26	—East and North-Coasts raided by airships	36	37
Otc. 1-2	—Ten airships raided East Coast and London District. Zeppelin L.31 brought down at Potters Bar	1	1
,, 22	—Aeroplane dropped bombs at Sheerness	—	—
,, 23	—Aeroplane dropped bombs at Margate	—	2
Nov. 27-28	—Hostile airships bombed North-East and Norfolk coast. One Zeppelin destroyed a mile off Durham coast, and another nine miles off Norfolk coast	1	16
Nov. 28	—Six bombs dropped by aeroplane on London	—	9
	Total	452	923

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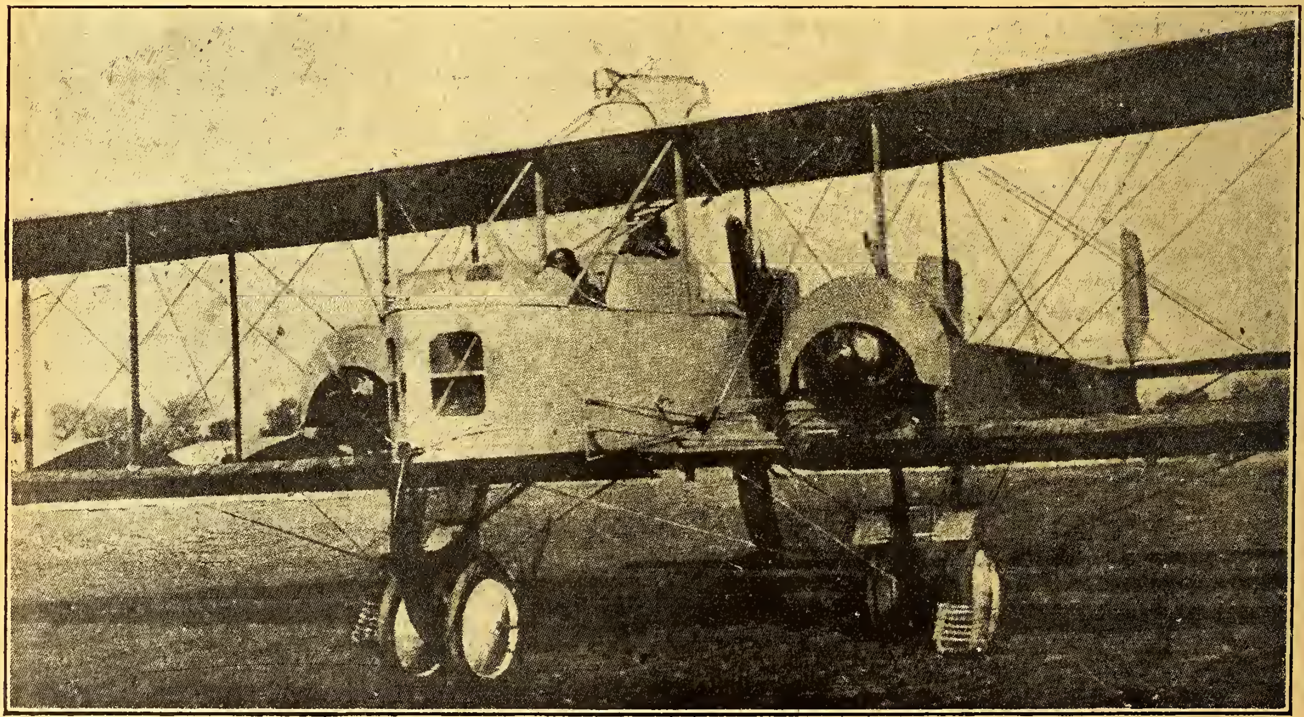
* 15 soldiers. † 13 soldiers



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ON THE WORK OF THE ROYAL FLYING CORPS IN 1916.

When one comes to write of the work of the Royal Flying Corps in 1916, one wants to perpetrate a large fat book about it; but one can imagine a good many R.F.C. officers saying, "Heaven forbid that that chap on THE AEROPLANE should ever do such a thing!" so one promises not to try. At the same time, someone ought to do for the R.F.C. what Mr. Kipling and Mr. Noyes have done for our seafaring people, as a change from the hysterical tosh of the daily papers and the rather too solid reports issued by the Air Board.

As a matter of fact, the Air Board Communicator has lost some excellent chances, for the reports, produced on a duplicating machine and sent round by R.F.C. Headquarters to the various squadrons, for private circulation and edification only, are by no means as stodgy as those which appear in the papers.

The humour of these reports is increased by the most ludicrous incidents being described in the most sober and restrained official language, much as the priceless "Eyewitness" of the early days of the war, Colonel Swinton to wit, described officially the toilet of a motor-driver on the Staff doing his hair with a tooth-brush.

A Foggy Recollection.

One recalls particularly a report of a reconnaissance machine, staggering home in a fog, a few feet above the ground over the German lines, and surprising a German staff officer, who, if one's memory is correct, fell off his horse and fled for the nearest cover, with his cavalry cloak streaming straight out behind him. One seems to remember, also, an explanatory note to the effect that for some good reason, such as lack of petrol, or the difficulty of climbing high enough to make a turn, it was not considered advisable to manœuvre further for the purpose of slaying him, but that the expression on the said officer's face when the machine suddenly loomed out of the fog right on top of him would remain among the most cherished memories of the crew of that aeroplane.

There is material in those reports alone for half a dozen Kiplings, and one mourns the loss of all the uplifting stories which might be gathered on R.F.C. aerodromes and in the R.F.C. messes after the day's work is over, if someone who knows the game were sent to collect them. However, this article is not intended to be an account of the individual adventures of R.F.C. officers, but merely a general outline of the Corps' work for the past year, so let us become strictly historical.

The Growth of the R.F.C.

The first thing that strikes one when looking back on the year is the enormous growth of the R.F.C. All London papers of consequence publish the "Gazettes" daily, and all London papers eventually find their way to Germany *via* neutral countries, so one may assume that the diligent Hun, with his fondness for bookkeeping, has a fairly accurate account of the R.F.C.'s present numbers, balancing the appointments against the casualties, and allowing a fair percentage for those who cease to fly owing to unreported accidents or to pure loss of nerve.

Though the formation of new squadrons or the numbers of the later squadrons are rigorously kept from publication, the number of officers appointed to be squadron-commanders and temporary majors, or wing-commanders and temporary lieut.-colonels, must make it possible to form a very close estimate of the number of squadrons available.

The number of men per officer is less easily estimated, nor does it matter much, because the really important thing is how many pilots can be sent over the enemy's lines, and, barring N.C.O. gunner-observers, the men affect the question chiefly in their capacity for keeping the machines in a condition to cross the lines. One might, however, at a guess, say that the rank and file of the R.F.C. runs into the hundreds of thousands, if one counts in those employed in workshops and stores at home, as well as the actual aerodrome hands. One doubts very much whether even the Germans have as many men in uniform employed on aircraft.

Machine Numbers.

When one comes to think of the enormous number of R.F.C. officers, and recalls the fact that each of them can with consummate ease, and without personal deterioration, successfully demolish four or five aeroplanes a year, one begins to see that Lord Montagu's demand for "ten thousand aeroplanes," which sounded so preposterous when he made it early in this year, must by now be handsomely exceeded as a rate of annual output, for, after all, it only means 200 machines a week.

The Judicial Enquiry Committee's report informed us a couple of weeks ago that the R.F.C. began the war by taking 66 aeroplanes abroad. Certainly not more than 40 of them were fit for war use, and probably not 20 were left after a fortnight on active service, so the effect of the work done in the past two years would be very good, even if the increase were evenly distributed; but when one recollects that practically the whole of the real increase has taken place in the last nine months of 1916, one begins to see what the effort of the past year really means.

It is true that quite a number of machines were in service at the end of 1915, but neither in quantity nor quality could they be compared with those across the water to-day. And, furthermore, when one realises that in the past four or five months even greater progress has been made in aeroplane design—by "trade" firms, *bien entendu*—and that quite a great deal has been done by the R.F.C. authorities to accelerate production, one has great hopes that the next few months may see the R.F.C. on the Western Front again holding that complete supremacy in the air which they held from June to October during the big fighting on the Somme.

The Early Months' Machines.

When the year began, the "Fokker Scourge" was at its height, and, though the Fokker monoplanes did not venture far over the British lines, they made it extremely dangerous for the British machines of the period to venture over the German lines, and casualties were out of all proportion to the amount of flying done.

Most of the British machines of the period were B.E.2cs, inherently stable tractor biplanes, either with reliable 70-h.p. Renault engines, in which case they would have made very nice touring machines, or else with 90-h.p. R.A.F. engines which made a hobby of disintegrating in the air, in which case the machines were obviously dangerous. Neither kind could compete with the German destroyers, and the type earned the nickname of "Fokker Fodder." The rest of the Corps' machines were French monoplanes; Moranes of no particular merit and very tricky to fly; sundry Voisins, a species of aerial "Tank," without the Tank's invulnerability; sundry R.Es., designed wrongly by the R.A.F. for reconnaissance, and eventually relegated to school work, though fitted with Beardmore engines which

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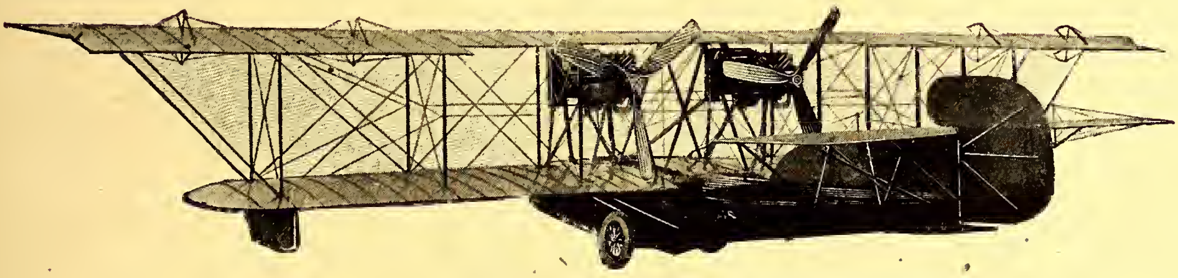

BEFORE THE WAR—
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might have been better used by almost any other designers; a number of Vickers "gun-'buses," which did good work with insufficient power, and made up in handiness what they lacked in speed. These last, and some few single-seater Bristol scouts, familiarly known as "bullets," were almost the only machines which had a sporting chance against the Fokker. The de Havilland fighters and the F.E.2bs were not then being delivered in quantities.

NEW TACTICS.

General Trenchard, G.O.C. R.F.C. in France, and his staff made every effort to meet the Fokker scourge by new aerial tactics. Reconnaissance machines, instead of crossing the lines singly, or in twos or threes, and trusting to their speed to get away from the enemy with their information, were sent over in squadron formation, trusting to numbers to beat off the enemy destroyers, and, where fast machines were available, these were sent with the formations, flying above them to meet and beat the Fokkers in the higher levels from which they were in the habit of diving to attack the slow reconnaissance machines. The "wireless" machines, confined to a regular beat up and down the line spotting for the artillery, were similarly protected by the Vickers fighters.

In this way the R.F.C. were enabled to get on with its work, but at the expense of some efficiency, because a greater number of machines were needed to do a given piece of work than would have been necessary if better machines had been available. The whole patrol was slower than the enemy's machines, and unable to climb as high, so they offered an easy mark for the enemy's anti-aircraft guns, and engine failures also made gaps in the formations, so that other machines were cut off by the enemy. Consequently, casualties were numerous.

The G.O.C.

Nevertheless, Army reconnaissance had to be done, and done it was, though one can well believe that no one felt more deeply the tragedy of existing conditions than did the G.O.C. and his staff. Those who have served with General Trenchard have always held him in the highest personal esteem, besides having very great respect for his soldierly qualities, and those who know him best realise that under his outward severity there is a deep concern for the welfare of his subordinates. Which accounts for the devotion felt towards him by the whole of the R.F.C., and also for the cheerfulness with which his orders were carried out during the very difficult period at the end of 1915 and the beginning of 1916, when those least informed may have thought that men were being wasted.

Waste there was, but through no fault of the G.O.C. in France, who for a period had to make bricks without straw, as in a previous issue it has been shown was the task also of the R.N.A.S.

Beaten in England.

The Fokker scourge could only be met and beaten in England, and beaten it was, as soon as real intelligence was brought to bear on the subject. The agitation in Parliament and in the Press strengthened the demands from France. Machines superior to the Fokker had existed in England ever since June, 1915, but, as the Report of the Judicial Committee admits, those in authority were slow to do what was necessary. After a while, Sopwiths, de Havillands, and Martinsydes began to come through in quantities, and engines which had previously been wasted on the inefficient products of the R.A.F. were put to good use. The R.A.F.'s one really creditable effort, the F.E.2b, was made in quantities, and very well made, by various contractors, and the best of the "trade" machines were put out to sub-contractors. For the first time commercial firms met with some degree of encouragement, and the resultant increase in quantity and quality was noticeable.

THE GREAT CHANGE.

Somewhere about March or April a great change took place in the R.F.C. administration. General Brancker, a gunner officer with experience of war in the air from the beginning, a consistently good flier—though one occasionally hears entertaining stories of his landings—who insists on testing new types of machines for his own education, was appointed Director of Air Organisation. With him there came to the War Office, General Salmond, D.S.O., and Colonel Charlton, both active-service officers who went to France with the original Expeditionary Force, and flew consistently.

Speeding Up.

As soon as these officers and those whom they chose as their assistants took charge of affairs, there was a very remarkable speeding up all round. The best existing machines were ordered in huge quantities, irrespective of who designed them. Quite important firms, whose own designs were not highly successful, were turned on to make machines to the more valuable designs of smaller firms. Engines, also, were ordered according to their value, and not according to the status or influence of their designers. Consequently, before long, really useful aeroplanes began to come through in quantities.

PRODUCING PERSONNEL.

Not only in machines was the improvement noticeable. The personnel of the Corps was expanded with equal

"Charlie."

The Mascot of a Wing of the R.F.C. in the Balkans, which arrived as a Christmas Card.

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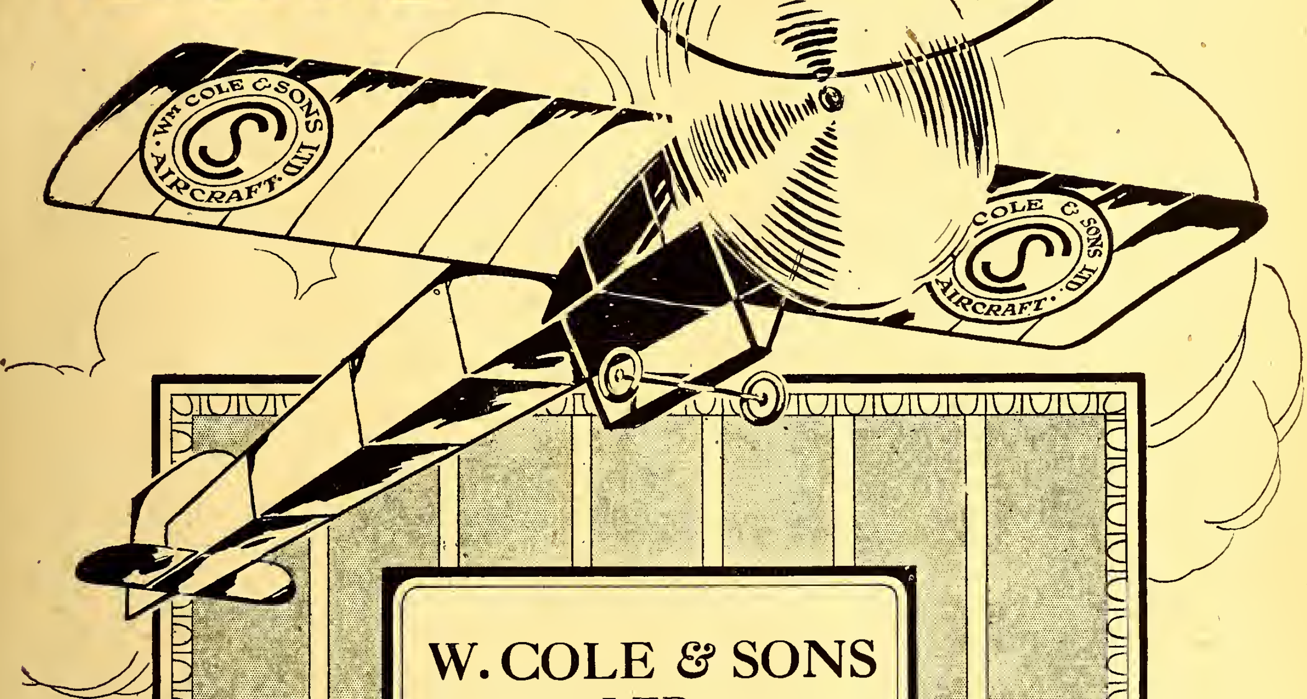
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rapidity. New schools were opened all over the country, till to-day, what with school areas and landing grounds for night pilots, one can scarcely have a fall in an aeroplane in England without hitting a flying ground of some sort, and, certainly, so far as the Eastern part of the country is concerned, any aeroplane at 8,000 feet is well within gliding distance of an aerodrome, no matter at what moment the engine may stop.

This increase in tutorial establishments was not confined to the mere teaching of flying. Big schools were established in the Southern part of England for the instruction of R.F.C. candidates as officers and potential gentlemen—an arduous task in certain instances, as instructors have found. At these schools the pupils learn all about an R.F.C. officer's job, except the mere flying.

Training for Stores.

Big instruction centres for Equipment Officers were also started, where candidates for R.F.C. ground jobs are taught the difference between a nut and a bolt, and how to keep stores properly, and how to write indents for "sticks, joy, pins, pivot for, one in number," so that there may be no chance of their breaking King's Regulations by writing an ordinary letter for "one of those funny little iron things that help the joy-stick to waggle without falling off." Seriously, though, the schools for E.Os. do work of very high value, and the smoothness with which the supply departments of the various squadrons are run is evidence thereof.

Those who regard the Army as purely wasteful may be interested to know that one part of the duties of certain E.Os. on active service is to collect all the components of wrecked aeroplanes, to sort them out into bins according to their various uses, to inspect them in detail to see whether they are fit for use, and to re-issue them as spares to the various squadrons. In this way some thousands of pounds' worth of stuff is saved per week, let alone much valuable time which would otherwise be wasted in getting supplies from England to replace parts which, under a less efficient Service, would simply be scrapped.

GUNNERY TRAINING.

One of the things which the Judicial Committee discovered about R.F.C. administration was that there had been inadequate attention to training in aerial gunnery and air fighting generally. This was one of the defects very promptly put right by the new administration.

"Gazettes" have shown a number of appointments to instructors in aerial gunnery, and to commandants and so forth of aerial gunnery schools, so that must suffice as an indication of what has been done and what is being done. It would be conveying very valuable information to the intelligent Hun if one indicated how instruction is given, but one may say that instruction is now being carried on in a very big way, with every arrangement in hand for still further expansion on lines which will assure the command of the air in both the near and distant future.

One can only hope that, if Peace breaks out prematurely, whatever Government may then be in power will see to it that this branch of the R.F.C. is fully developed, for on it depends the integrity of the British Isles in all future wars.

The Importance of Gunnery.

> "Infantry move by the lie of the land;
> Cavalry's only what horses can stand"—

as Mr. Kipling has said.

Similarly, reconnaissance, photographic, artillery-spotting, and bombing aeroplanes have their very distinct limitations, and must be protected by fighting machines. The fighting machine may have the finest pilot in the world, it may have unmatched speed and climb, it may have a perfectly reliable engine, and yet it must be perfectly useless unless the gunner on board can shoot well and unless he knows his gun. The best of guns jam at times, so the best of shots is useless unless he can put his gun right immediately when anything goes wrong.

Moreover, a first-class gunner on a second-class machine can lay out a second-class gunner on a first-class machine, unless the other fellow deliberately runs away. Thus, when one comes to look at the question dispassionately, one sees that any air fleet, like any sea fleet, can hold its own by superior gunnery.

The argument holds equally good whether one is dealing with ordinary machine-guns, as to-day, or whether in time to come someone produces some marvellous

The Perils of Agriculture near the C.F.S.

Hodge, as he receives the flask of a looping pilot: "D—— these 'ere Flying Schools."

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mechanism which makes it possible to use authentic cannon on the huge aeroplanes of the future. Hence, the prime importance of developing our aerial gunnery schools to the utmost limit of effectiveness. Those officers who have done so much already to develop this branch of the Corps deserve very great credit for the sound foundations which they are laying for our future supremacy in the air.

HOME DEFENCE WORK.

It must have seemed fairly logical to most people at one time that the task of defending this country against invasion by air belonged by right to our First Line of Defence, the Navy. Unfortunately, their late Lordships of the Admiralty did not appear to think so, and therefore the R.N.A.S. was never organised with this end in view.

In their default the task of tackling what was commonly known as the " Zeppelin Menace " was taken over by the Home Command, who delegated the flying part of the business to the R.F.C.

At the beginning of the year, the R.F.C. had no anti-airship organisation whatever, and, as the natural result, several officers were killed in gallant attempts to fly at night without proper arrangements or practice. Thereafter the problem was properly tackled, and highly satisfactory results soon followed. Major Higgins, now Lieut.-Col., developed the practice of night flying, and arranged proper systems of landing lights and so forth, besides doing much valuable organising work. Major Holt, D.S.O., now also Lieut.-Col., undertook the general organisation of aerial defence, and his efforts have been crowned with conspicuous success, as witness the sinking of airships at Cuffley, Potters Bar, and at two places in Essex, as well as those off the coasts of Durham and Norfolk.

Future Raids.

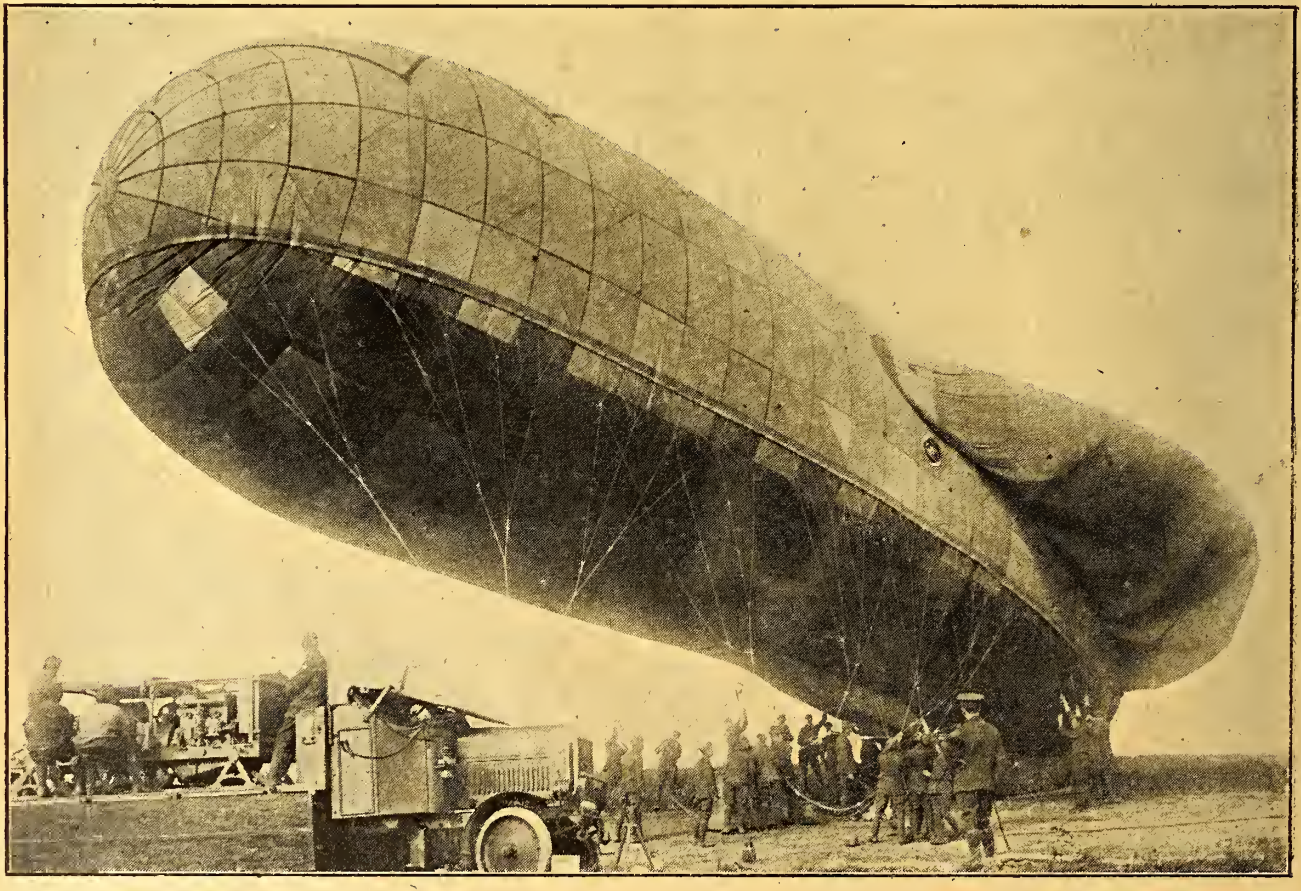
Four consecutive airship raids have ended in disaster for the invaders, two of them in double disasters, so that, though no one can guarantee that no further invasions will take place, one can, at any rate, lay odds that no airship will escape unhurt in future raids.

It may be that the enemy may think it worth while to make a big raid with thirty or forty ships, for some political object, or in the vain hope of causing or of bringing to a head some crisis in England. And it may be that in doing so the enemy may be prepared to sacrifice half his invading force in order to achieve his object. In that case one may be sure that he will pay dearly for his experiment.

It is more probable that aeroplane raids, similar to that on London recently, but on a far bigger scale, will be made, in which case one assumes that those officers who have done so well in preparing defence against airships have made equally effective preparations against aeroplanes, even at the 15,000 feet or more at which the aforesaid raider is alleged to have arrived.

It is well to remember that at such a height an aeroplane would be invisible from the ground in this country, or, at any rate, unrecognisable, even with glasses; that, therefore, the only real safeguard is aeroplane patrols along the coast from, say, Folkestone to Harwich. If such patrols cannot be kept up all day and every day, they should, at any rate, operate on days which are suitable for such raids, and on clear nights, moonlight or otherwise.

It is not enough to plead that such patrols cannot be done. Politicians said that it was impossible to prevent or meet airship raids, and yet they were prevented, or, at any rate, adequately met, and, anyhow, these patrols would be good practice in routine work for young pilots. And they would help to remove the complaint that pilots are sent on active service without enough flying service.



Photograph from Canadian War Records.

The New Type Kite Balloon used by the R.F.C. K.B. Sections, showing also the Winch Tender.

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The Archie Section.

Incidentally, one must not leave the subject of raids without acknowledging the good work done by the Royal Garrison Artillery in improving the efficiency of the anti-aircraft guns. They have handled the problem with great skill, and have gone far towards solving it. One does not assume that we have a system of mobile "Archies" as fine as that of the Hun, but we certainly have excellent fixed gun defences, and wonderfully fine searchlights, as results have shown. Those quaint lights, which flicker among the clouds without showing any corresponding beam from the ground, must be a bit of a puzzle to observers who do not comprehend their true inwardness.

The time will certainly come when the Archie Section will be part and parcel of whichever or whatever Air Service is charged with the defence of this country, for it is all part of the same game, and calls for precisely similar knowledge in many directions. Moreover, the Anti-Aircraft Batteries offer fitting employment for many a good man whose flying days are done, but whose knowledge of flying is too extensive to allow those in authority to waste him by turning him out of the Service. So far as one can trace, no ex-fliers have gone to the Archies, but there are possibilities.

THE R.F.C. ABROAD.

As regards the R.F.C. abroad, when once the improved machines turned out under the new administration began to arrive, things altered very materially, and in three months the R.F.C. obtained a dominance aloft which for a time, from June to September, at any rate, amounted to the complete command of the air.

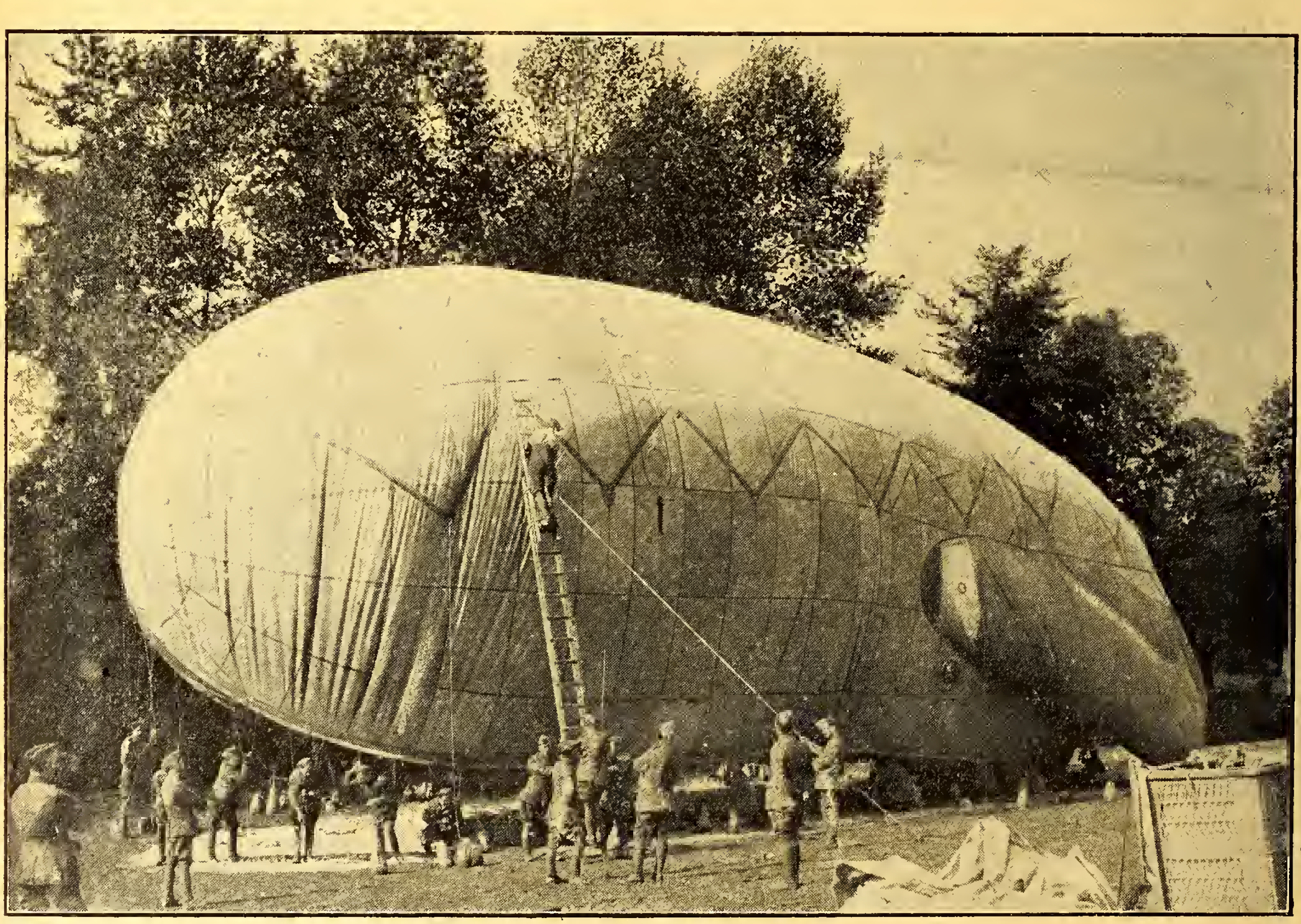
During the preparations for the "Big Push" on the Somme in July, German aeroplanes were hardly ever seen over the British lines, and, when the push was actually begun, the R.F.C. with its rocket machines calmly proceeded to go over into German territory and wipe the German kite-balloons out of the air.

Meantime the fighting machines, de Havillands, Bristols, Martinsydes, and F.Es., kept the German "destroyers" well away behind their own lines, so that the slower British machines, engaged in spotting for the guns and photographing German positions, could work uninterrupted, except for the Huns' Archies. Even these were kept within reasonable limits, partly because by ranging our own guns onto them it was possible to keep them so far behind the lines that they could do little damage to aeroplanes actually over the lines, partly by skilful bomb-dropping, assisted by the greatly improved bomb-sights and release-gears developed not long before, and partly by the simple and sporting, if somewhat hazardous, expedient of coming down low with a fighting machine and machine-gunning the crews of the mobile Archies, when they could be found in open country.

The Infantry Aeroplane.

In the course of the Push, the R.F.C. appeared in a new manifestation, which, although much has been heard about it as a French dodge, actually appears to be of British origin.

The invention of the "creeping barrage," in which the curtain of artillery fire creeps forward ahead of the advancing infantry, washing out the enemy's machine-guns and keeping his men down in their trenches, is ascribed to General Congreve by those who have served on the Somme. The drawback to the creeping barrage was, however, that, in the ardour of a successful attack, victorious infantry were apt to hurry ahead of their time-table and walk into their own barrage with disastrous effect.



Photograph from Canadian War Records.

One of the R.F.C. New Kite Balloons being "bagged down" for the night.

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The R.F.C., therefore, introduced the use of aeroplanes as a link between the infantry and the guns. Telephonic communication between advancing infantry and the guns could not be maintained, as the wires were constantly cut and repairs caused delay. Runners were so frequently shot down by the enemy's barrage, either taking messages to the guns or returning for further orders, that this method was both expensive and unreliable. By either method time was wasted, and for the creeping barrage to be effective it was necessary for the infantry to be all but in it, so that the time factor was all important. Moreover, from ground level, where all landmarks had been obliterated by gun-fire, it was difficult to indicate verbally or by message just where shells were falling.

As soon as the "infantry aeroplanes" were introduced, the whole business was simplified. Each aeroplane, flying low down, in wireless touch with its own group of batteries, and with a bird's-eye view of its sector of the line, was able to watch at once the fall of the shell and the advance of the infantry, with whom it was also in touch by visual signalling. Consequently, the barrage could be advanced only a matter of yards ahead of the infantry, and only on precisely such sectors as the advance was required. If the infantry were held up, the barrage was concentrated on just the place which was holding them up. If they found a weak spot and advanced quickly, the barrage was advanced correspondingly.

The whole arrangement worked like a clock, and the results obtained are the best witness to the ingenuity and simplicity of the scheme. None the less, very great credit is due to the keenness and high discipline of the R.F.C. pilots and wireless operators who so quickly grasped the principles of the new system of warfare and maintained so effectively the signalling service between the other two arms.

Besides this transmission of signals, the R.F.C. had the job of watching the enemy's moves outside the barrage. For example, if counter-attack was seen to be developing, the aeroplanes directed the guns onto the enemy's infantry in assembly trenches or in concealed positions, and many a promising attack was thus nipped in the bud before it even had a chance of reaching the line of the regular barrage. Thus the R.F.C. infantry aeroplanes had to be two kinds of guardian angel at once.

GROUND FIGHTING.

Presumably by way of comic relief from the sameness and uniform peril of such work, the infantry aeroplanes are said to have so far forgotten themselves on occasion as to come down low and turn their machine-guns onto enemy infantry in column on the road to the trenches.

The fighting machines, too, which ordinarily keep well aloft to protect the signalling machines, have frequently been known to descend and machine-gun trains on the move, in default, one assumes, of the Hun fighting machines, which had for the time being been driven out of the air in the Somme district.

There is a joyous story of the early days of the Somme Push, when for the first time cavalry broke through and had a chance of using the *arme blanche,* of how the cavalrymen, British and Indian, gleefully seeking Boches to slay, were amazed by a perfectly mad aeroplane, which hurtled up and down in front of them, quartering the ground like a pointer, and indicating by bursts of machine-gun fire the presence of groups of terrified Huns.

Such was, of course, in nowise the regular trade of that aeroplane, but it indicates what may be a proper use of armed aeroplanes in such time as the enemy's armies may break, and when our "Armies of Pursuit" may come into their own.

The Observer's Job.

Picturesque as may be the newer uses of aeroplanes in war, the older uses, such as plain reconnaissance and the protection of reconnaissance machines against enemy destroyers, are not less dangerous or less worthy of reward, and, so far as reconnaissance is concerned, a good observer may well be regarded as a higher type of mentality than a good fighting man. Perhaps too much in the way of honours and awards has been given to the scrappers, for it is well to remember that, while the fighter without the observer is little use to the Army, the observer is essential to the Army's existence. One does not forget that without the fighter the observer would be wiped out under existing conditions; but if one supposes that the observer could be mounted on so fast a machine that the fighter could not catch him, then one must admit that the observer could do his work without any fighters of his own to protect him, and thus one arrives at the conclusion that the observer is the more essential of two essentials.

Apart from which, one must admire above all things the nerve of the observer who goes up day after day, trusting entirely to the skill and judgment of another man, whose intellectual capacity he may not necessarily hold in any high esteem.

As one who sobs with terror when he has to trust himself to the common or London taxi-driver, the present writer has the highest respect for the man of trained intelligence, as a good observer must be, who deliberately relies on another person for his safety. Therefore, he ventures to suggest that, when honours are next being handed round, special consideration should be given to those gallant youths who wear a single wing with a round O at its base.

The New Menace.

Towards the end of September, or early in October, the Hun aeroplane-makers began to turn out machines which gave considerable trouble on the West Front. The little Halberstadts, and Albatroses, and the thing called by our people the German Spad, played to a modified extent the part which the Fokker had played a year earlier, only they dived from 20,000 feet onto our machines at 17,000, where the Fokker dived from 12,000 or so onto our machines at 8,000 to 10,000. And because "the higher the fewer," not so many men can go to 20,000 feet without heart trouble as can go to 15,000 feet. Also, not so many Huns can fly these 120-mile-an-hour projectiles, so the actual numbers are probably less than in the days of the Fokker scourge.

Moreover, the R.F.C. at home is now under very much more enlightened control than it was a year ago, and active-service pilots have more to say and are more readily heard on questions of equipment. Therefore, there is little chance of last year's tragic delay, on which the Judicial Committee was so emphatic, being repeated.

One hears of conferences between officers of high rank taking place without delay, and of vehement instructions being issued on the subject of output, of new models; so one expects that the Huns' new frightfulness will not give them a very long run for their money, especially as British machines already exist which are more than the equal of the new German machines.

The R.F.Cs.' Brigadiers.

The personnel of the R.F.C. abroad has been excellently handled throughout the year. The appointment of young brigadiers, which has done so much good with

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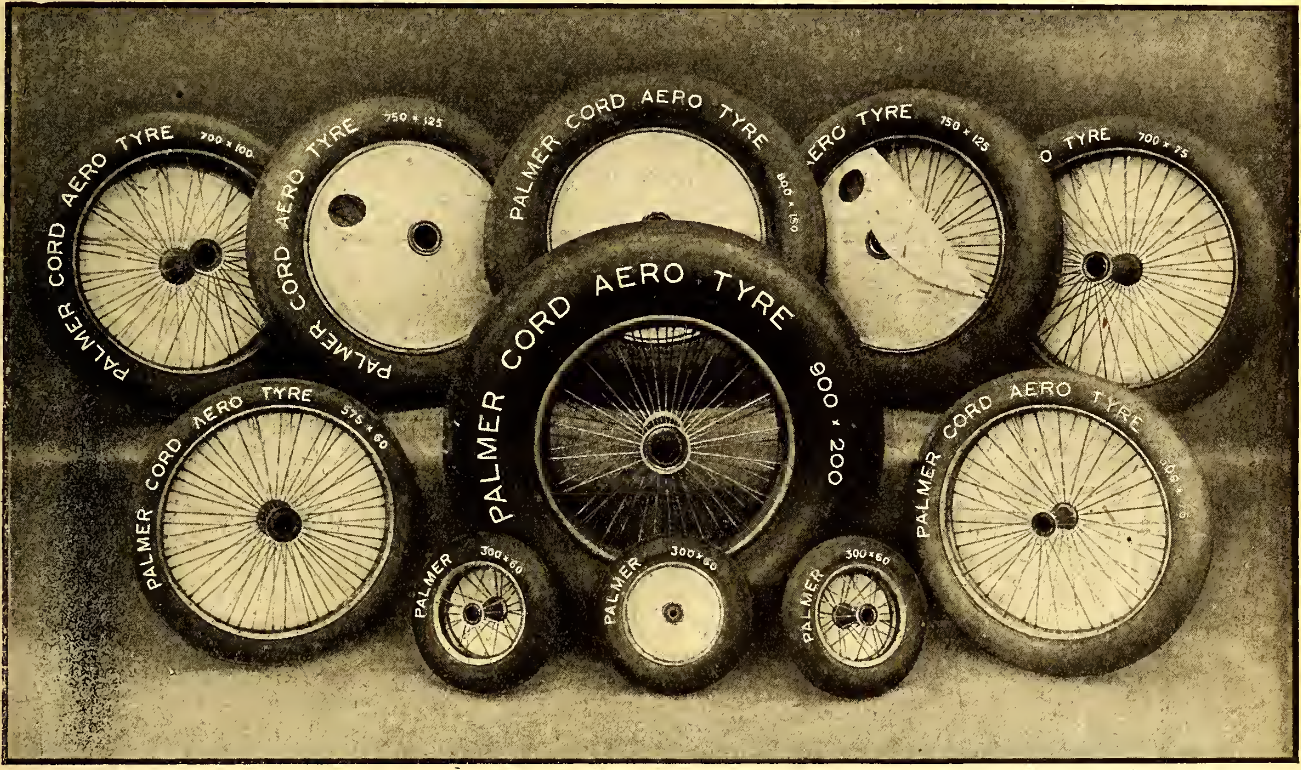
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"	21	160.	28.	Central	"	38	178.	38.09	132/46	"	47	185.	55.	125/60
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					750×125	2	185.	55.	135/50	1100×200	52	185.	55.	116/69
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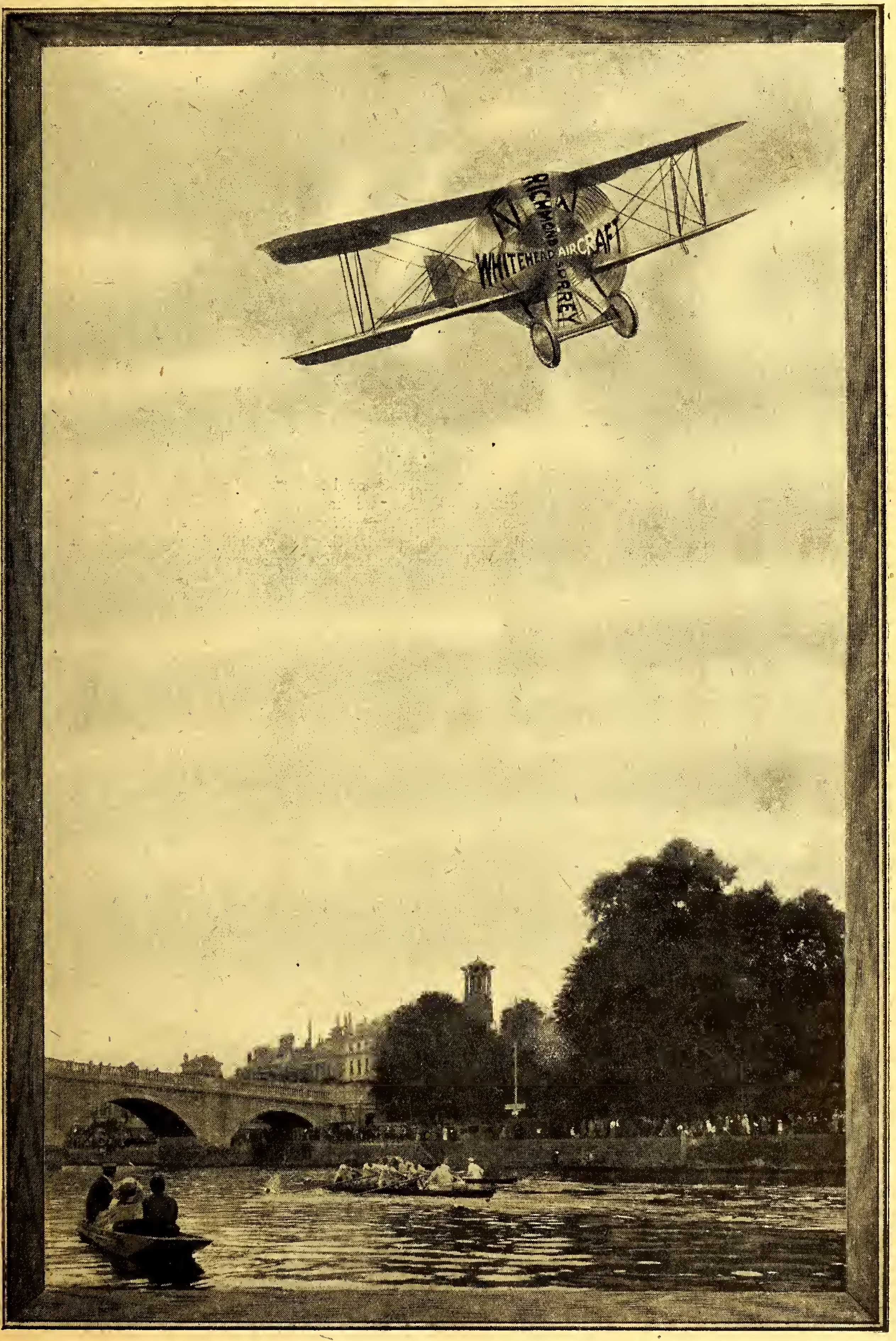
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the rest of the Army, has had equally good effects in the R.F.C. Officers of the calibre of Generals Ashmore, Brooke-Popham, Webb-Bowen, Pitcher, Hoare, Longcroft, and the brothers Salmond could not fail to bring the officers and men under their command to a high state of efficiency, and to them the British Army, not to mention the armies of our Allies and the British Empire at large, owes a deep debt of gratitude for having made the R.F.C. what it is to-day.

Kite-Balloons.

Remarkably good work has been done by the R.F.C. Kite-balloon sections. This force originated from the R.N.A.S. Kite-balloons, organised by Colonel Maitland and Squadron-Commander DelaCombe. When the Army found that it needed Kite-balloons, it decided that they rightly belonged to the R.F.C., and so, rather than use Naval K.Bs. in co-operation, they took over several R.N.A.S. sections bodily, and made the personnel into soldiers by the simple process of changing their caps and badges.

Major the Hon. Claude Brabazon, who was one of the organisers of the first K.B. sections, took the first detachment abroad. A training establishment was set up alongside the R.N.A.S. K.B. station, and played under the command of Major the Hon. John Boyle, R.F.C., who was later joined by his brother, Capt. the Hon. Alan Boyle, who will be remembered as one of the very first British aviators of the years 1909-10.

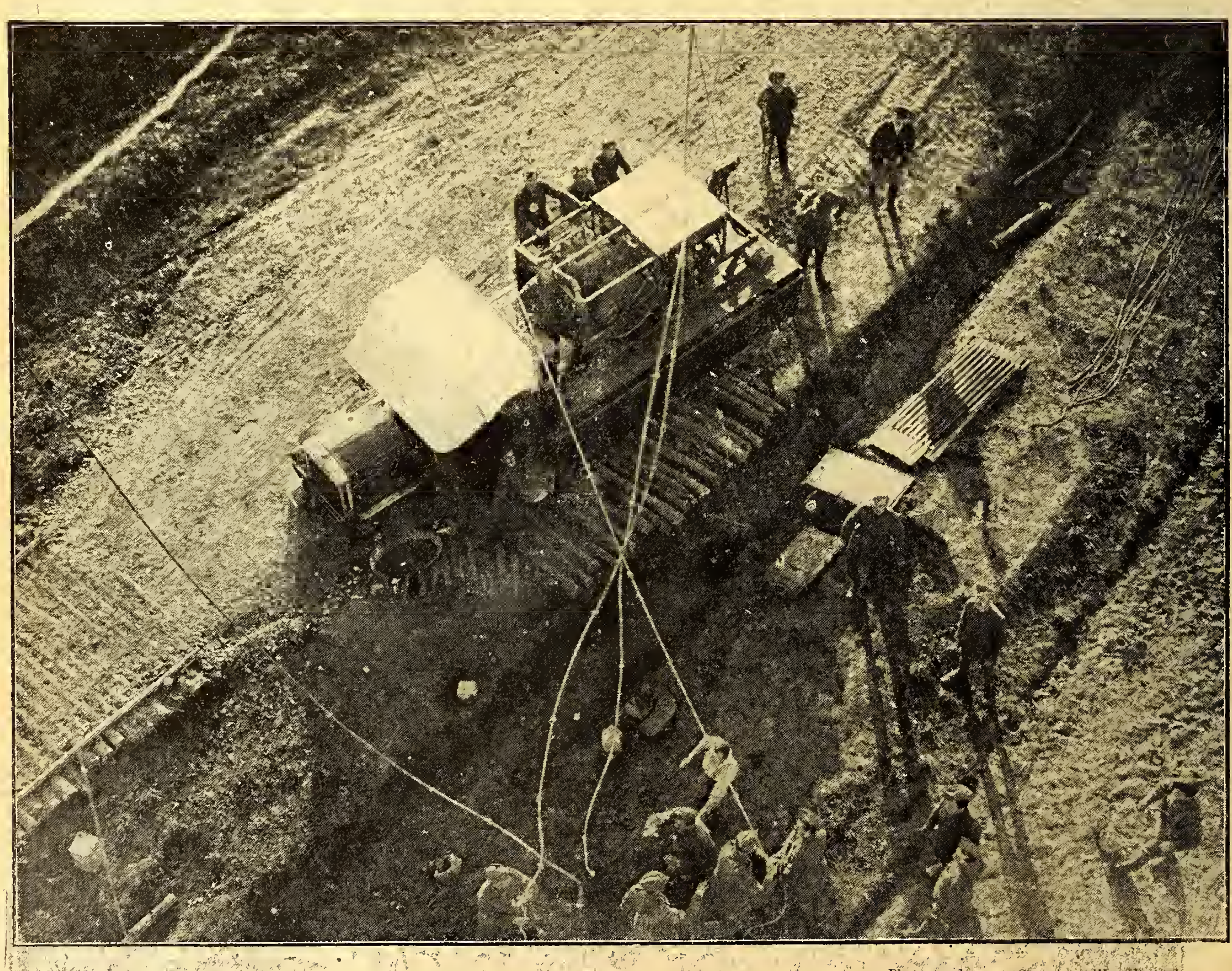
From that school numerous highly successful K.B. squadrons have been turned out, and these, as we all know, have done most valuable work on the Somme, in which fighting the K.B. personnel has suffered its casualties through accidents to defective parachutes and errors in handling as well as from hostile fire from guns and aeroplanes. Queer as is its aspect, the Kite-balloon has thoroughly justified its existence with the Army as well as with the Navy.

At the Minor Wars.

Apart from the Western Front, the R.F.C. has distinguished itself highly. Dispatches from Mesopotamia have mentioned the gallant efforts of the R.F.C. under Major Reilly, and later under Colonel Massy, and of the Australian Flying Corps under Captain (now Major) Petre, despite enemy machines "of superior speed and fighting capacity"—to quote General Lake's last dispatch.

In Egypt, the various General Officers composing the Mediterranean Trinity—apropos which, read the Mediterranean Creed—have borne witness to the work of the R.F.C. under Colonel Massy, and later under Colonels Joubert de la Ferté, Groves, and Carden, and of the Australian detachment under Captain Oswald Watt (late of the French Army). Sir Reginald Wingate, Sirdar of the Egyptian Army, has recorded the gallant acts of the R.F.C. under Major Bannatyne in the Darfur Campaign. The present G.O.C. at Salonique has commended the work in the Balkans of the R.F.C. under Colonel Dawes.

Also, we have heard of the excellent moral effect of R.F.C. machines on the Indian Frontier against the Mohmands, though, with their usual disregard for the time factor and their apparent high regard for eternity, neither the Indian Military Command nor the India Office has seen fit to issue any dispatch on this subject.



Photograph from Canadian War Records.

A photograph from a Kite-Balloon of its own Winch Tender.

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The Future of Output.

Taking the R.F.C. all round, every officer and man in the Corps has good reason to be proud of its record. It is human to err, and there are still certain things to be put right before the whole organisation approaches the human limit. The weakest spot is in the handling of output, but, as it seems likely that this nasty commercial business will be handled ere long by mere business men, perhaps there is no need to labour the point. One gathers that the professorial class has its own ideas of accelerating output, of accessories as well as essentials. Also, though much good work has been done by the cream of the motor trade, as assimilated by Adastral House, one is occasionally confused by a doubt as to the precise scientific difference between cream and scum, though the one substance is highly conducive to efficiency, and the other may be simply poisonous.

Therefore, when the mere routine of output is handed over to the Ministry of Munitions, as seems to be the official intention, the professors and motor merchants can go on experimenting to their hearts' content without interfering with the regular output of machines and arms for the R.F.C. on active service, and, if they evolve anything really good, one may be sure that the new production department, or Air Supply Department, as it seems likely to be called, will turn it out in quantities as quickly as is at all possible.

The Path to Perfection.

However, when once the supply question is put on the most efficient possible footing, things will be remarkably better for the people on active service. So long as the same intelligence, ability, and initiative is displayed in the Administration of the R.F.C. in the future as has been shown during the last nine or ten months of 1916, the Army will have little cause for complaint, and the R.F.C. will have much cause for pride and satisfaction. Already the Corps is probably the most efficiently organised force of its kind in the world, and the best one can wish it is that it may keep steadily on its present path towards perfection.

C. G. G.

THE AFFAIRS OF THE FLYING SERVICES.

Although the precise machinery by which the supply of aircraft is to be dealt with is not yet made public, it is possible to give a general review of the chief changes which are being made in the Flying Services.

The Royal Naval Air Service will in future be under the command of Commodore Godfrey Marshall Paine, C.B., M.V.O., R.N., who becomes Air Lord of the Admiralty. It is understood that Admiral Vaughan-Lee, R.N., leaves the Naval Air Service, but it is not yet officially made known whether Commodore Sueter remains in charge of matériel. In any case, important changes must take place in his department, as there will be no buying department in future.

Lieutenant-General Sir David Henderson, K.C.B., D.S.O., retains his position as Director-General of Military Aeronautics, and, as a member of the Army Council, occupies a position precisely analogous to that of Commodore Paine at the Admiralty. It is generally understood that considerable changes will take place in the Department of the R.F.C. which deals with matériel.

The Air Board, which will presumably in due course become the Air Ministry, will have Lord Cowdray as Chairman, and it is understood that it will consist of two representatives of the R.N.A.S., two representatives of the R.F.C., two representatives of the Ministry of Munitions, a Technical Adviser, and a Parliamentary Secretary.

Representatives in the Ministry.

The Naval and Military representatives are not as yet announced, but it is stated that Mr. Percy Martin, managing director of the Birmingham Small Arms Company and of the Daimler Company, who is already in charge of the output of all internal-combustion engine work for the Ministry of Munitions, will represent the Ministry on the Air Board, and Mr. William Weir, of G. & J. Weir, of Glasgow, the well-known engineers, who are also largely interested in aircraft work, will be responsible for the aeroplane side of the argument. It is not yet announced whether there will be a Chief of Department in the Ministry of Munitions to co-ordinate the work of these two sub-departments, but obviously there should be some such official.

Dr. T. E. Stanton, F.R.S., Superintendent of the Engineering Department of the National Physical Laboratory, is mentioned as the probable Technical Adviser of the Air Board, and Major J. L. Baird, M.P., who recently took his certificate as an aviator, will continue to act as Parliamentary Secretary, representing the future Air Ministry in the House of Commons. Lord Cowdray will, of course, represent the Air Ministry in the House of Lords.

The First Air Lord.

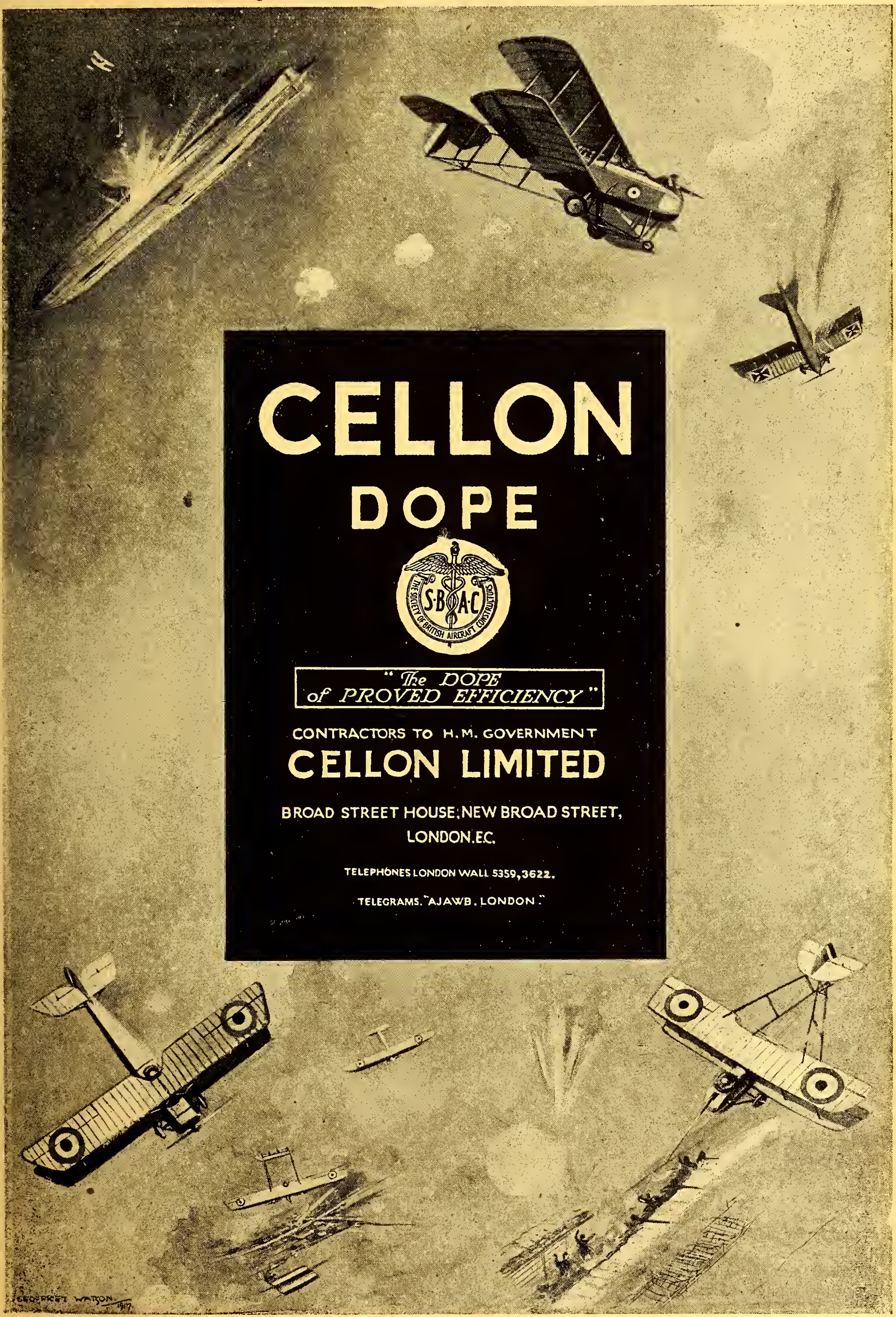
The appointment of Commodore Paine is certainly one of the best things their Lordships of the Admiralty have yet done. Commodore Paine has been intimately concerned with aviation ever since it was recognised as of any military importance. He was the first Commandant of the Central Flying School when it was a joint Naval and Military affair, and in that capacity he obtained a knowledge of practical flying which is probably equalled by very few officers of either Service.

In conjunction with Major, now Major-General, Trenchard, he performed the astounding feat of running a joint Naval and Military establishment with notable absence of friction.

He won the high personal regard of all those who served under him, and at the same time inculcated and preserved a fine spirit of discipline among all those who passed through the school, who were in truth a motley gathering. He was responsible for the output of all the Military pilots, and a fair proportion of the Naval pilots, until many months after the outbreak of war, and the excellence of the work done by those trained under him is sufficient indication of his ability to control men.

After he left the Central Flying School he was placed in charge of the training of Naval pilots, and from that date onwards there was a remarkable improvement in the personnel of the Royal Naval Air Service.

While at the Central Flying School, Commodore Paine acquired the reputation of not only being able to control men, but of being able to obtain supplies from the War Office—which was in itself a remarkable feat in the early days of aviation—and there is still a legend among the old hands of the Central Flying School that on one occasion, when the pupils had successfully demolished nearly all the school machines, the Commandant went personally to the War Office, and in the course of one



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forenoon persuaded the permanent officials in the various departments to pass the necessary papers for further supplies of school machines as far through the usual routine as they would have reached normally in the course of three or four weeks. Those who were at the Central Flying School at that period always had a lurking belief that the Commandant's famous walking-stick, which was his inseparable companion at Upavon, must have played an all-important part in this unusual acceleration of routine.

Commodore Paine's record in relation to both the Flying Services is one of unqualified success, and one can wish him nothing better than that in his new and exalted position he may continue the good work which he has done in the past.

INTERNAL MACHINERY.

Precisely what will happen in the Services, under the new arrangement by which the Ministry of Munitions will control contracts and output, one cannot at the moment say with certainty. It is obvious, however, that a large number of men who are at present employed in the Inspection Departments of the two Services will be released for more productive work, for there will be no need for two separate sets of inspectors, examiners, and viewers to be maintained.

The supply of aircraft can obviously be accelerated considerably when placed in the hands of one Department, if only by preventing the waste which is caused by one firm manufacturing two, and in some cases three, different types of machines for either or both of the Services, instead of devoting all its energies to one type.

At present one finds one and the same firm manufacturing, perhaps, big seaplanes for the Navy and small scouts for the Army, and probably several other firms employed in a similar manner, whereas, if each firm concentrated on one type, the output would obviously increase. Under centralised control, also, it will be possible to use material much more economically, as it will prevent the accumulation by one Service, or by one firm, of stocks of material for which another firm is waiting, in order to make machines for the other Service. In fact, in every way all-round efficiency of aircraft output should be very materially increased.

ENCOURAGING EXPERIMENTS.

One hopes that those responsible for output will recognise that, while rapidity in output is essential, and may be very greatly increased by causing each firm to concentrate on one type of machine, or engine, as the case may be, it is equally important that every firm should be encouraged to produce experimental machines in the hopes that the result may be better than anything which is at the moment in use.

It should be one of the functions of the Air Supply Department of the Ministry of Munitions to see that every aircraft firm is able to obtain all it may require from engines down to raw wood and metal for the rapid construction of its experimental types.

THE DESIGN DEPARTMENTS.

It has been suggested that the Design Departments of the two Services should be amalgamated. It seems possible, however, that this would be a mistake, because a large amount of competition between the two Design Departments is just as desirable as it is undesirable that there should be competition between the two Services in the purchase of material.

Centralisation of the Designing Departments would either lead to intense internal friction, which would prevent any result from being obtained, or it would lead to mutual agreement on designs produced by co-operative mediocrity, in which case the net result for the active-service pilot would be even worse than it was in the days when the Royal Aircraft Factory was omnipotent. Competition in design, both between the Services and between manufacturers, should be encouraged in every possible way.

POSSIBILITIES FOR GOOD.

Undoubtedly the new arrangement possesses immense possibilities for good. Of that the present writer is convinced—otherwise this paper would not have supported for the past two months the handing over of Air Supplies to the Ministry of Munitions at a time when practically everybody in the Aircraft Industry was bitterly opposed to the Ministry of Munitions having anything to do with the control of aircraft.

At the same time it is equally clear that, unless the question of supply is energetically and intelligently handled by the Ministry of Munitions, there are possibilities of a far worse state of affairs than existed before, because, unless the very best types of machines are chosen on the advice of active-service pilots, and unless the theories of stay-at-home "experts" are studiously ignored, or treated with the gravest suspicion, we may find ourselves once more busily constructing in thousands aeroplanes which are of high theoretical value but of no war value whatever.

Both the Air Ministry and the Air Supply Department of the Ministry of Munitions would do well to bear in mind that in such matters quick decisions and the courage to cut losses on all mistakes are the essentials of success. Meanwhile, one wishes everybody concerned with the new venture every success, and one bespeaks for them the goodwill and earnest co-operation of all those in the Aircraft Industry.

C. G. G.

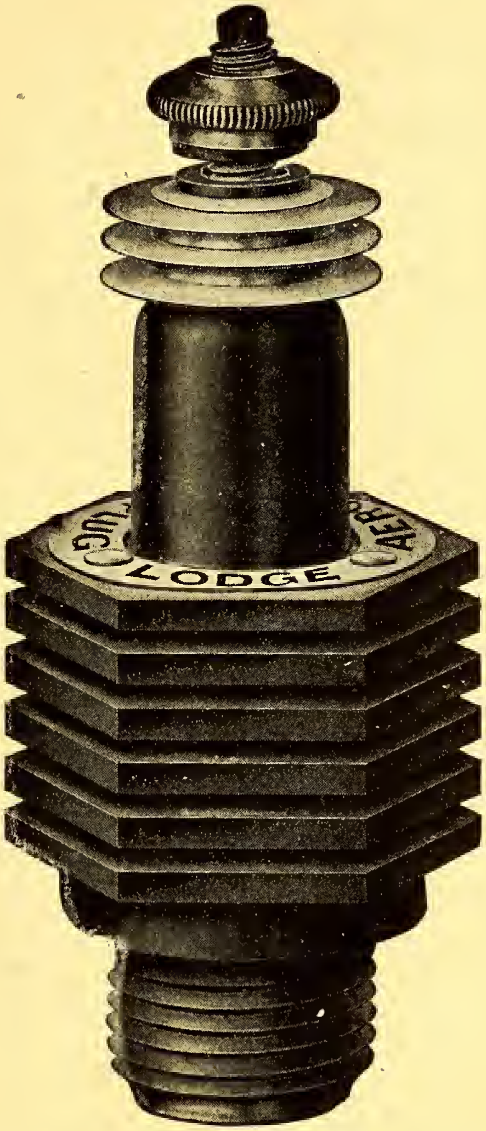
The Future of the Royal Flying Corps.

BY "BERKELEY."

"*Military Virtue of an Army. This is distinguished from mere bravery, and still more from enthusiasm for the business of War . . . [Bravery] . . . must lose that impulse to unbridled activity and exercise of force which is its characteristic in the individual, and submit itself to demands of a higher kind, to obedience, order, rule and method. . . .*" (Clausewitz on War, Bk. III, Ch. V.)

During the past year the Royal Flying Corps (Military Wing) has by the nature of its work in the field and at home and by the devotion and single-mindedness of a number of its senior officers done much to bring it in line with those regiments whose story is a part of English history. The Military flying service began its career without traditions and handicapped by the euphuisms of Sir John Seely, then an Under-Secretary of State for War.

At the outbreak of war all other corps of the Army, save one, had earned the laurels of the soldier on many fields of action, and tradition gave each an assurance of continued military splendour in the days to come. The Royal Flying Corps (Military Wing) had to create traditions, to make regimental history. And, despite all the drawbacks of mixed personnel and inadequate



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equipment, there is little question that to-day the Royal Flying Corps has begun the acquisition of a proper tradition. Mere bravery has ceased to be its only asset—an asset shared in no less degree by the rest of the Army—but it has imperceptibly and possibly unknowingly begun to realise the true principles of military virtue.

The Hard School of Experience.

The Military Wing has been fortunate in that its career has begun in a great war, and that it was denied long years of peace in which to prepare for the ultimate test of all soldiers. The stern necessity of war and the experience gained at the hands of an effective enemy have given a generation of development in a few months of time.

Its growth in peaceful days, misdirected possibly by external pressure from minor politicians wedded to popular, and therefore untenable, theories, might have drifted along strange lanes of perilous progress to ultimate disaster.

The main duties of the Royal Flying Corps in war can be outlined as follows :—

1. Reconnaissance :
    - (i) Strategical.
    - (ii) Tactical.
2. Co-operation with artillery.
3. Bomb-dropping, etc.
4. Fighting enemy aircraft.
5. Dispatch-carrying and such-like minor duties.

Strategic Reconnaissance.

Before the war had furthered the design of aircraft, strategical reconnaissance implied a journey of great risk on single-seated machines for a distance of fifty miles behind the enemy lines. Any greater distance would, while quite possible, be of very doubtful success. To-day reconnaissances four hundred miles in length are possible not only on fast scouts but also on two-seated aeroplanes in which a trained observer can be carried.

In all conditions of war, whether the opposing forces be entrenched throughout the length of their front, or whether the campaign be open, the importance of reading a part of the enemy strategy by knowing of concentrations and moves well behind his lines cannot be exaggerated. In war, the most rapid of operations is a matter of weeks rather than days and hours.

An attack at one part of the line affects the position of the whole front. Troops have to be collected and matériel has to be diverted to the new striking point. Supplies of all kinds must be brought into position in order that full advantage may be taken of any successful effort. For days before the actual hours of attack the strategic railways behind the enemy lines will be crowded with trains proceeding slowly to and from the allotted sector. The roads near the railhead in use also will be covered with additional artillery, wagon trains, and troops on their way to reinforce the point of attack.

The Value of Secrecy.

Without aircraft and under trench warfare conditions, such movements might be made in complete secrecy. The effort to counter possible attacks imagined from the hearing of unusual activities in enemy trenches would result in most cases in the wearying of the troops and the unnecessary displacement of vast quantities of matériel. With aircraft used efficiently, strategic movements on the part of the enemy are infinitely more difficult.

The night in place of the day becomes the time of concentration. Before the dawn of each new day, until the moment of battle, all traces of altered dispositions must be removed. The tracks made by bringing big guns into opposition have to be concealed or altered in appearance, and the emplacements themselves have also to be covered. Feints are necessary at other points of the line. A forthcoming attack at Ypres must be hidden from the enemy by a determined assault on Verdun.

A Thin Dividing Line.

But part of this reconnaissance is tactical. The main duties of strategical reconnaissance are to reveal the preparations well behind the lines. And, in so far as it is possible to judge, this work has been well done by the Royal Flying Corps. No part of the German lines for a depth of nearly a hundred miles is unknown to the British, or French, aeroplane.

For strategic reconnaissance it should be possible in the immediate future to employ a large, fast machine, capable of carrying, in addition to pilot and passenger, adequate means of defence, a proper photographic outfit, and sufficient fuel for an eight hours' flight. Speed and duration of flight are the first essentials. The rest can follow.

Tactical Reconnaissance.

Tactical reconnaissance, or an ardent curiosity as to the detail movements of enemy troops actually in contact with the army to which one is attached, requires a special skill coupled with extensive knowledge of the art of war. The æsthetic pleasures of watching a practical demonstration of a "biological necessity" from above should be ruthlessly sacrificed to the work of indicating enemy movements to one's friends below.

For this work the aeroplanes employed may be swift, but they *must* be equipped with means of defence, as the fighting aeroplane which on occasion may accompany the machine employed on strategic reconnaissance cannot habitually be spared to guard the interests of those whose work lies closer to friendly lines.

Not only is it necessary that enemy movements should be reported, by wireless if of urgent importance, but the position of one's troops during an action must be indicated to the general staff in order that the necessary support may be given and that the artillery may restrict their homicidal instincts to practice on enemy subjects. There are, no doubt, in use devices by which the infantry can, when advancing, show their position to the reconnoitring aeroplanes.

Gun Spotting.

The aeroplanes employed for co-operation with the artillery should be reserved entirely for that use. The employment of artillery officers as observers on spotting machines would be an advantage, but is hardly possible, because the artillery requires for its own purposes all the efficient officers available. In any case, observers detailed for these duties should be trained exclusively for spotting, and for that purpose might be attached for preliminary training to a battery of artillery before getting actual aerial experience.

In common with the reconnaissance machines, the "spotting" aeroplanes should be fitted with cameras in order that a record of the success or failure of the artillery preparation may be retained for the jubilation or confusion of the battery commanders concerned.

Bombardment Aircraft.

Bomb-dropping has a very real value among the duties of the Royal Flying Corps. To the Royal Naval Air Service it is largely a matter of joy and of aimless relaxation from the common round, whereas to the military flying personnel it is an essential duty. But, to be

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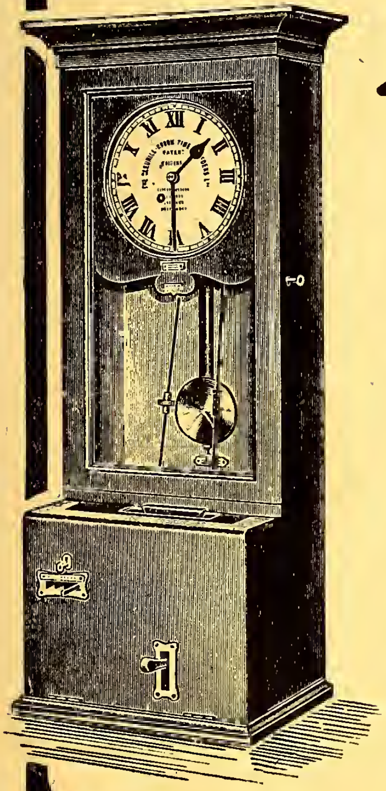

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of value, military bomb-dropping must bear a close relation to the military operations of the moment.

An aeroplane may, on return from a strategic reconnaissance, report extensive movements on the railways behind the enemy lines. There will naturally be some point, some railway junction, at which these varied movements converge. If the junction or junctions can be indicated, it is then the duty of the bomb-dropping aeroplanes to eliminate sufficient of the railway line to delay the move until the opportunity, whatever it may be, is lost. Troops reinforcing enemy positions, and possibly arriving from the peaceful plains of Germany, should be harried with bombs until their joy in war has gone before belligerent experience has been properly acquired. The academic calm of General Headquarters (German, not English) should be destroyed with vigour when perchance the correct map reference is known.

On the Offensive.

On occasion it is desired that the offensive shall be resumed by the British troops, and at the correct hour and the correct point the attack is launched. It is then the duty of the bomb-droppers to destroy as much as possible of the enemy's strategic roads or railways immediately supporting the threatened sector, in order that he will be unable to bring up reserves from the base, or troops from unattacked portions of the line.

But in whatever manner the Royal Flying Corps carries out this part of its duties, it must be and is always in conjunction with the strategic plan in operation at the time.

Air Fighting.

The fourth duty shown above is in part connected with reconnaissance. Fighting aircraft equipped solely for the elimination of enemy aircraft are of high use as a means of preserving the serenity of the observers in the reconnaissance and spotting aeroplanes, in order that their work may not suffer by reason of external interests or undue haste. In addition, if effective, they should prevent enemy reconnaissance machines from penetrating the veil of secrecy in which it is desirable that our operations should be shrouded.

But defence of other aircraft or of the British lines is not the principal sphere of action proper to the fighting aeroplane. Obedient to the underlying principle that a vigorous offensive is the surest means of defence, the fighting squadron will of necessity seek out the enemy aeroplane behind his own lines and over his own aerodrome, and there, if Fortune be kind, will destroy him. An offensive supremacy is necessary to the Royal Flying Corps, in order that other duties can be carried with certainty and with a moderate degree of security.

Aerial Transport.

The fifth duty explains itself. As a means of carrying urgent papers of great length and possibly of a highly confidential nature, the aeroplane is without rival. If rumour speaks truly, this use of aircraft has been demonstrated practically on many occasions during the present war.

The Art and Pastime of Photography.

The development of aerial photography in the future will, it is certain, be on a huge scale. At present, excellent and unexpected though the results may be, the whole subject is in its infancy. Even to-day there is a photographic record of every inch of each effective battle front.

Daily maps are made of trench systems and enemy positions on which future operations are based. Methods, possibly satisfactory, have been devised for the elimination of distortion in these photographs, in order that collectively they may have the value of a map based on a trigonometrical survey

The possibilities of the extension of this branch of the work of the R.F.C. can be left to the imagination. Perhaps in some future day of peace personnel of the Royal Flying Corps will be employed, as were the Sappers in years gone by, in the preparation of a photographic map of the British Empire, in conjunction with the Ordnance Survey!

More Expansion.

The expansion of the Royal Flying Corps (Military Wing) during the past two years has been enormous, and yet to-day it is probably proportionately of less strength in relation to the present Army than it was to the Expeditionary Force of pre-war days. The correct proportions, even for the conditions of the next few years, will not be attained until the war terminates and the Army is reduced in numbers, while the Royal Flying Corps remains at its present strength in personnel and increases greatly in matériel.

N.C.O. Pilots.

The existing scheme of giving the duties of piloting almost exclusively to the commissioned ranks is not likely to remain the rule for many months longer. As aeronautical experience increases and the control of aeroplanes simplifies, it is more and more likely that the pilot will be drawn from the rank and file, as is the Army Service Corps (M.T.) driver. The observer will, in view of the importance of his duties, be in all cases an officer. [One knows of warrant and non-commissioned officers whose experience of practical warfare has been of high value in reconnaissance. These observers, however, are likely to receive commissions, and in many cases have already received them.—Ed.]

The Supply Branch.

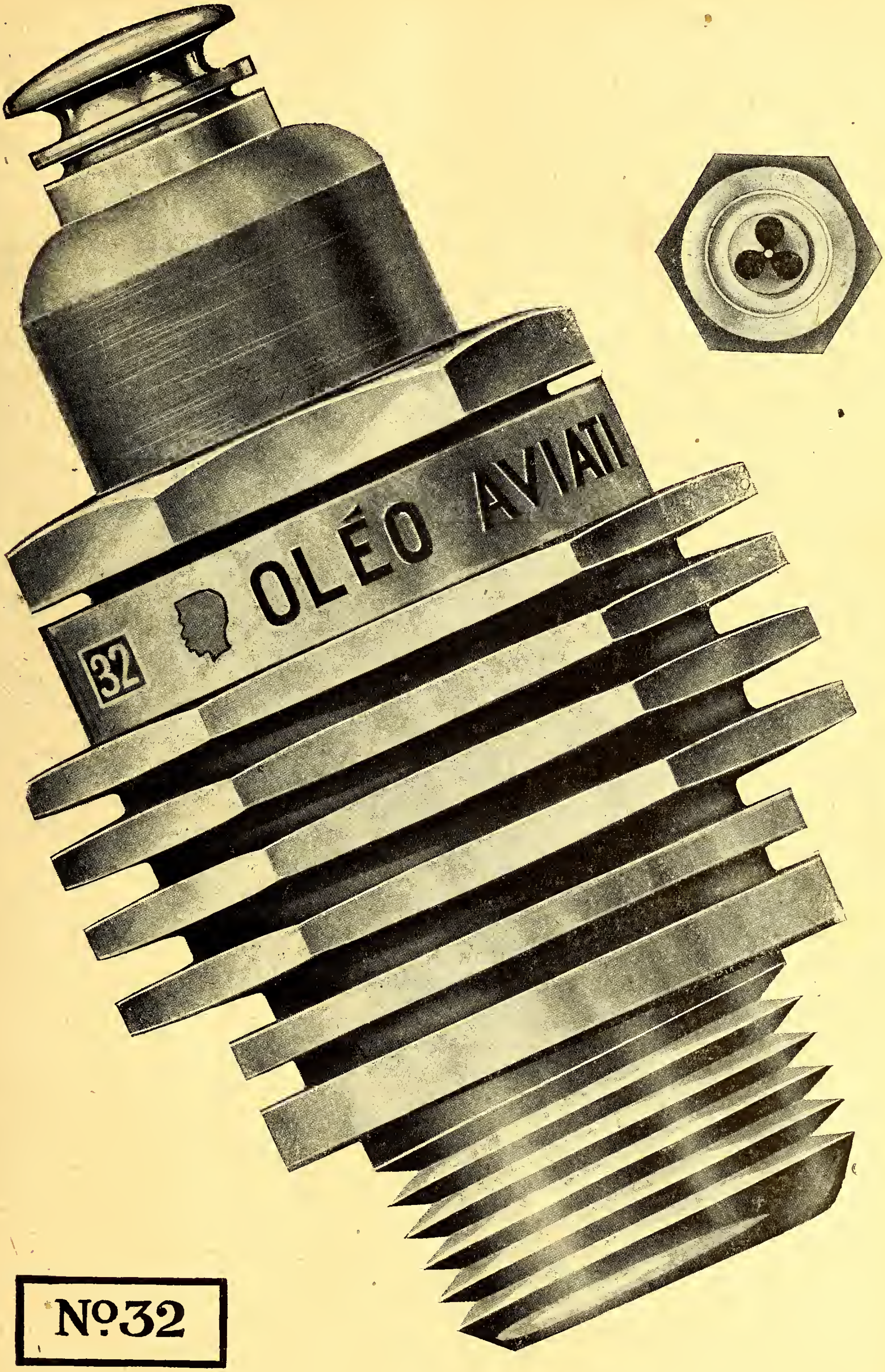
It is difficult under present conditions to foresee in what manner the supply of matériel will be directed in peace-time, when the Ministry of Munitions ceases to be, and hotels are once more permitted to welcome Youth and Beauty, who will work at pleasure instead of playing at work. It is to be hoped that the Department of Aircraft Supplies will be under the Master-General of Ordnance, but, in deference to public opinion, the creation of an independent department for aircraft matériel is more probable.

Future Control.

The present system of administration of the Royal Flying Corps is unlikely to vary in any considerable degree during the next few years, unless the dreams of the ill-advised come true and a single independent Air Service be substituted for the two existing units. While the Director-General of Military Aeronautics has a seat on the Army Council, it is unlikely that the Army will be permitted to underestimate the value of the Royal Flying Corps.

With the return of peace, it is to be hoped that officer personnel for the R.F.C. will pass through Sandhurst or Woolwich in the manner customary in the Army generally. While the selection of the Royal Flying Corps by a cadet as the unit he is desirous of joining may be permitted, each cadet chosen for the Flying Service should be attached to an infantry unit for a preliminary period of training in the common usages of military life. When the Royal Flying Corps becomes historical, this system would cease.

The employment of the Royal Flying Corps on Home Defence is not dealt with, as it involves questions not suitable for publication in the news sheets of the day.



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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Jan. 2nd, 1917.

Admiralty, Dec. 28th.

R.M.L.I.—The following supernumerary Capt. is absorbed in establishment:—I. T. Courtney, Dec. 15th, 1916, vice Waller, promoted.

R.N.A.S.—Temp. Prob. Flt. Sub-Lts. to be temp. Flt. Sub-Lts —L. A. Sands, Feb. 3rd, 1916; A. H. Allardyce, Mar. 15th, 1916; R. K. Slater, April 8th, 1916; A. P. Haywood, May, 9th, 1916; J. K. Fryer-Smith, May 14th, 1916; H. L. F. McLean, June 7th, 1916; R. Birks, June 11th, 1916; E. P. Will, F. C. Walker, S. F. Ingram, June 18th, 1916; J. E. Thomas, June 19th, 1916; D. W. Ramsay, June 28th, 1916; F. J. Hosking, July 16th, 1916; F. R. Johnson, July 19th, 1916; J. R. Allan, J. M. Turner, July 20th, 1916; C. F. Brewerton, G. L. Elliott, July 30th, 1916.

War Office, Jan. 2nd.

REGULAR FORCES. — Establishments. — R.F.C. — Flying Officers.—Sec. Lt. (on prob.) W. E. Jones, Spec. Res., Dec. 6th, 1916. Temp. Maj. M. Elphinstone, A.S.C.; Temp. Sec. Lt. G. R. Craig, M.C., E. Lan. R., from attd. Lan.Fus.; Sec. Lt. J. M. R. E. St. Amory, Spec. Res., Dec. 7th, 1916. Temp. Capt. (Capt. Res. of Officers) G. D. Begg, M.C., R. Sc. Fus., and to be transferred to Gen. List; Sec. Lt. F. W. Keddie, Spec. Res., Dec. 9th, 1916.

Flying Officers (Observers).—Maj. A. S. W. Dore, Worc. R., T.F., Mar. 20th to Nov. 3rd, 1916. Temp. Lt. J. C. O. Dickson, S. Lan. R., and to be transfd. to Gen. List, May 6th, 1916.

Equipment Officers, 3rd Cl.—Temp. Sec. Lt. R. de Sarigny, Gen. List, Aug. 24th, 1916. Sec. Lt. C. B. Carr, Kent Cyc. Bn., T.F.; Sec. Lt. (on prob.) J. Ferguson, Spec. Res.; Temp. Sec. Lt. (on prob.) A. F. Lang, Gen. List; Temp. Sec. Lt. E. Edwards, Gen. List; Temp. Sec. Lt. (on prob.) E. C. Rumford, Gen. List, Dec. 13th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. W. E. Soper resigns his commission, Jan. 3rd, 1917. Sec. Lt. (on prob.) J. M. R. E. St. Amory is confirmed in his rank. To be Sec. Lts. (on prob.):—F. E. Bayley, Dec. 9th, 1916. D. Rintoul, Dec. 10th, 1916. A. N. Meier, Dec. 11th, 1916.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. (temp. Maj.) C. F. Cape reverts to the temp. rank of Capt., and is secd. for duty with the Aeronautical Dept., Dec. 14th, 1916.

R.G.A.—Lt. (temp. Capt.) G. G. Clark is secd. for duty with the Regular R.G.A., Dec. 20th, 1916. Sec. Lt. J. F. Lawson is secd. for duty with the R.F.C., Sept. 19th, 1916.

* * *

[The list of officers, N.C.Os. and men of the R.F.C. mentioned in the dispatch from Field-Marshal Sir Douglas Haig will be found at the end of the R.F.C. Honours List, which commences on p. 160.—Ed.].

* * *

From the "London Gazette" Supplement, Jan. 3rd, 1917.

War Office, Jan. 3rd.

REGULAR FORCES.—Staff.—Attached to Headquarters Units.—Temp. Sec. Lt. S. M. Wood, from a Flying Officer, R.F.C., and to be temp. Capt. whilst so employed, Oct. 16th, 1916.

Lt. R. Whitaker, Rif. Brig., from an Adjt., R.F.C., and to be temp. Capt. whilst so employed, vice Capt. J. A. M. Lang, Notts and Derby R., Nov. 5th, 1916

Establishments.—R.F.C.—Adjutants.—Sec. Lt. (temp. Lt.) F. C. Dixon, Dorset R., Spec. Res., from an Equipment Officer, 3rd Cl., and to retain his temp. rank whilst so employed, Nov. 1st, 1916. Capt. R. J. H. Purcell, K.R.R.C., and to be secd., vice Capt. P. Sidney, North'd Fus., Nov. 26th, 1916. Lt. F. G. Stammers, R. Suss. R., from a Balloon Officer, Dec. 7th, 1916.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. (temp. Capt.) H. M. Giles is secd. for duty with the R.F.C., Dec. 25th, 1916.

Infantry.—Lond. R.—Sec. Lt. E. H. Penberthy is secd. for duty with the R.F.C., Dec. 10th, 1916.

* * *

From the "London Gazette" Supplement, Jan. 4th, 1917.

War Office, Jan. 4th.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdr.—Temp. Sec. Lt. B. L. Dowling, Gen. List, from a Flying Officer, and to be temp. Capt. whilst so empld. Dec. 7th, 1916.

Equipt. Officers, 1st Cl.—From Staff Lts., and to be temp. Capts. whilst so empld.—Sec. Lt. C. H. Whittington, Spec. Res., Dec. 14th, 1916. Temp. Sec. Lt. H. M. Bentley, Gen. List, Dec. 18th, 1916.

Scottish School of Fitters.—Chief Instr. (graded as an Equipt. Officer, 2nd Cl.).—Temp. Capt. I. U. D. Truman, Gen. List, from a Flying Officer, Oct. 21st, 1916.

Netheravon School of Fitters.—Chief Instr. (graded as an Equipt. Officer, 2nd Cl.).—Temp. Sec. Lt. A. Latimer, Gen. List, from an Equipt. Officer, 3rd Cl., and to be temp. Lt. whilst so empld., Dec. 1st, 1916.

Aeronautical Inspection Dept.—The following temp. appt. is made:—Asst. Inspr.—Sec. Lt. J. A. O'Brien, Lond. R., T.F., and to be temp. Hon. Lt. whilst so empld., Dec. 11th, 1916.

Memoranda.—To be temp. Lt.-Col.:—Capt. (temp. Maj.) C. M. Waterlow, R.E., while empld. as a Wing Comdr., R.N.A.S., Aug. 21st, 1916.

Sec. Lt. K. L. Williams, Ind. Army Res. of Officers, to be temp. Lt. while serving with R.F.C., Dec. 1st, 1916.

Sec. Lt. (on prob.) F. S. Andrews, from R.F.C., Spec. Res., to be temp. Sec. Lt. on Gen. List for duty with R.F.C., June 29th, 1916.

To be temp. Sec. Lts. (on prob.) for duty with R.F.C.:—Actg. Sgt. D. Barron, from R. Highrs., Spec. Res., Dec. 12th, 1916. L. Hamblin, Dec. 28th, 1916.

TERRITORIAL FORCE.—R.F.C.—The following announcement is substituted for that which appeared in "Gazette" of Dec. 28th:—C. A. Walker-Leigh (late temp. Maj. Res. Bn.), R. Fus., to be Maj. (temp.) with pay and allowances of Capt., and to be Adjt., Dec. 29th, 1916.

* * *

From the "London Gazette," Jan. 5th, 1917.

War Office, Jan. 5th.

TERRITORIAL FORCE.—Yeomanry.—Cyclist Co.—Sec. Lt. D. S. Johnson to be temp. Lt. whilst empld. with the R.F.C. Nov. 1st, 1916.

R.E.—Sec. Lt. N. A. Grandage to be temp. Lt. whilst empld. with the R.F.C., Nov. 1st, 1916; Sec. Lt. W. E. Reed to be temp. Lt. whilst empld. with the R.F.C., Nov. 1st, 1916.

Infantry.—Liverpool R.—Sec. Lt. A. W. Smith to be temp. Lt. whilst serving with the R.F.C., Nov. 1st, 1916.

Middlesex R.—Sec. Lt. L. H. Scott, M.C., to be temp. Lt. whilst serving with the R.F.C., Nov. 1st, 1916.

Argyll and Suth'd Highrs.—Sec. Lt. J. D. Cowie to be temp. Lt. whilst serving with the R.F.C., Nov. 1st, 1916.

London R.—Sec. Lt. E. C. Stringer to be temp Lt. whilst serving with the R.F.C.; Sec. Lt. G. E. Godsave to be temp. Lt. whilst serving with the R.F.C.; Sec. Lt. C. G. Shaumer to be temp. Lt. whilst serving with the R.F.C., Nov. 1st, 1916.

* * *

From the "London Gazette" Supplement, Jan. 6th, 1917.

War Office, Jan. 5th.

The King has been pleased to award the Military Medal for bravery in the Field to the undermentioned man:—

6640 1st Cl. Air Mech. H. Alexander, R.F.C.

* * *

War Office, Jan. 6th.

Memorandum.—To be temp. Sec Lt. (on prob.).—Pte. R. J. Paton, from A.S.C. for duty with R.F.C., Dec. 8th, 1916.

Amendment.—Correction to "Gazette" of Jan. 1st, 1917. Page 32.—Military Cross Awards.—For temp. Maj. T. E. St. C. Daniell, Gen. List and R.F.C., read Temp. Capt. (now temp. Maj.) T. E. St. C. Daniell, Gen. List and R.F.C.

REGULAR FORCES.—Infantry.—North'd Fus.—Temp. Sec. Lt. H. V. Long, from Gen. List (R.F.C.), to be temp. Sec. Lt. (attd.), Jan. 7th, 1917, but with seny. from Sept. 5th, 1916.

TERRITORIAL FORCE.—R.F.A.—Sec. Lt. M. Burbridge is seconded for duty with the R.F.C., Dec. 12th, 1916.

Infantry.—Middx. R.—Sec. Lt. A. S. A. Herne is seconded for duty with the R.F.C., Nov. 21st, 1916.

London R.—Sec. Lt. (temp. Capt.) R. M. A. Edlundh is secd. for duty with the R.F.C., Nov. 22nd, 1916.

* * *

From the "London Gazette" Supplement, Jan. 8th, 1917.

War Office, Jan. 8th.

REGULAR FORCES. — Establishments. — R.F.C.—Park Comdrs.—Qrmr. and Hon. Lt. (temp. Capt.) G. Laing, R.F.C., from an Equipment Officer, 1st. Cl., and to be temp. Major whilst so employed, Nov. 1st, 1916. (Substituted for notification in the "Gazette" of Dec. 29th, 1916.)

Second Reserve.—R. Dublin Fus.—Temp. Sec. Lt. J. J. Malone, from Gen. List, R.F.C., to be temp. Sec. Lt., Jan. 9th, but with seny. from Sept. 26th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lts. to be Lts.—M. R. H. A. Allen, (Temp. Capt.) W. J. B. Curtis, W. M. Pethybridge, B. J. W. M. Moore, M.C., H. A. B. Robb, M.C., G. D. Etches, W. J. Hewitt, T. G. G. Bolitho, W. W. Stenning, R. W. Le Gallais, (temp. Capt.) H. R. Lecomber, S. Davenport, J. S. D. Harries-Jones, (temp. Capt.) E. S. Perrin, L. C. Boyd, R. H. Cronyn, S. Allenby, Dec. 1st, 1916.

Sec. Lts. (on prob.) confirmed in their rank:—L. H. Gibbon, H. P. Reid, J. T. Rossiter, H. H. Leage, W. H. G. Furnivall, H. D. Lehmann, S. Blackley, C. L. Baldwin, W. E. Nuttall, N. Martin, J. G. Wilson, J. G. Hope, A. G. Griggs, R. Hunt, S. H. Bell.

To be Sec. Lts. (on prob.):—G. D. Eckardt, Nov. 6th, 1916. H. L. Tracy, R. S. Bennie, Nov. 21st, 1916. H. W. Wheatly,

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Dec 7th, 1916. H. R. South, Dec. 10th, 1916. D. Sutherland, J. T. Menzies, V. A. Stewart, H. T. Leslie, G. O. Lightbourn, J. A. MacKay, A. L. Schario, A. MacN. Denovan, E. S. Meek, C. G. Wood, W. A. Leslie, W. W. Rogers, R. U. Phalen, D. Leishman, G. E. Cushing, A. G. Walwyn, R. L. M. Ferrie, Dec. 19th, 1916.

TERRITORIAL FORCE. — R.F.A. — Sec. Lt. (temp. Lt.) H. H. Thomas is secd. for duty with the R.F.C., Dec. 15th, 1915.

NAVAL.

The following appointments have been made in the Royal Naval Air Service :—

JAN. 3rd.—Mr. B. J. Albery, granted temp. commn. as Lieut. (R.N.V.R.), seny. Jan. 1st.

The following temp. commns. as Sub-Lieut. (R.N.V.R.), have been granted, seny. Jan. 1st :—T. H. Piper (C.P.O. W.T.), R. H. Methold, E. H. Pollett, L. F. Plugge, H. V. Hamilton, W. Hinsley, and O. P. Tidman.

JAN. 4th.—Messrs. V. G. Austen, A. D. M. Lewis, W. W. Wakefield, E. G. A. Eyre, A. G. Raven, H. P. Guard, N. S. Wright, E. W. Coveney, S. J. C. Ellis, S. A. Randle, O. W. Redgate, T. A. Warne-Browne, G. P. W. Earle, and G. Peach, all entered as Proby. Flt. Officers (temp.), seny. Jan. 21st, and apptd. to "President," addl., for R.N.A.S.

JAN. 6th.—Flt. Sub-Lt. (temp.)—G. E. Johnson, granted temp. commn. as Sub-Lt. (R.N.V.R.), seny. Jan. 4th.

Wt. Officer, 2nd Grade (temp.).—H. C. Mills, promoted to Lt. (temp.) (R.N.V.R.), seny. Jan. 2nd.

* * *

ADMIRALTY COMMUNIQUÉS.

JAN. 4th.—A German Wireless Press message as received in the Mediterranean contained the following :—

> The American Government is raising a protest to Great Britain for allowing British airmen to bombard the station of Drama before the ejected delegates and Consuls had left, in face of the airmen's knowledge that the delegates had to be met at the station.
>
> This bombardment, which, of course, was unsuccessful, is the latest case in the history of the breach of international law by the alleged protectors of smaller nations.

A report which had been received from the Vice-Admiral Commanding, Eastern Mediterranean, giving details of the bombing of Drama (in Macedonia) by British aviators, serves admirably to illustrate, when compared with the German Wireless Press message of December 1st, the methods of the German propagandist.

The substance of the Vice-Admiral's report is as follows :—

> The representatives of the German, Austrian, Turkish and Bulgarian Governments, when expelled from Athens, were sent at their own request, together with their families and servants, by specially chartered steamer to Kavala.
>
> After being landed, a request from the German Minister was conveyed to the Thasos Air Station, asking that the Drama-Kavala road might not be bombed for 24 hours from 6.45 a.m. on November 25th, as it was being used by women and children belonging to the evicted enemy Legations.
>
> The commanding officer of Thasos Air Station not only complied with this request, but, as a further act of grace, refrained from any operation against Drama Station and aerodrome until November 28th, when both were bombed with effect.
>
> The only attack made on November 25th was upon the Drama aerodrome alone, and was carried out before the message from the German Minister reached the Allied Air Station at Stavros. No bombs were dropped in or near the town, nor in the vicinity of either the station or the Drama-Kavala road. This report was substantiated by photographs.

JAN. 6th.—On Jan. 4th a squadron of British naval aeroplanes attacked the railway bridge over the Maritza river at Kuleli Burgas.

One span of the bridge is reported to have been completely wrecked.

THE CASUALTY LIST.

Reported Jan. 9th.

DIED.—Porter, Sub-Lt. George H., R.N.V.R.

MISSING.—Croft, Flt. Lt. John C., R.N.

Todd, Flt. Lt. Allan S., R.N.

Vereker, Flt. Lt. Henry C., R.N.

Hibbard, Lt. Sidney R., R.N.V.R.

ACCIDENTALLY INJURED.—Millson, Flt. Sub-Lt. Bertie A., R.N.

Russell, Probationary Flt. Sub-Lt. Frederick S., R.N.

Wilson, Sub-Lt. Alan F., R.N.V.R.

PERSONAL NOTICES.

DEATHS.

BUSK.—Flight Commander Hans Ackworth Busk, R.N., who was reported missing on Jan. 6th, 1916, and is now officially presumed killed, was the youngest son of the late T. T. Busk and Mrs. Busk, of Hermongers, Rudgwick, Sussex, and of 6, Wadham Gardens, Regent's Park. He was 21 years of age.

* * *

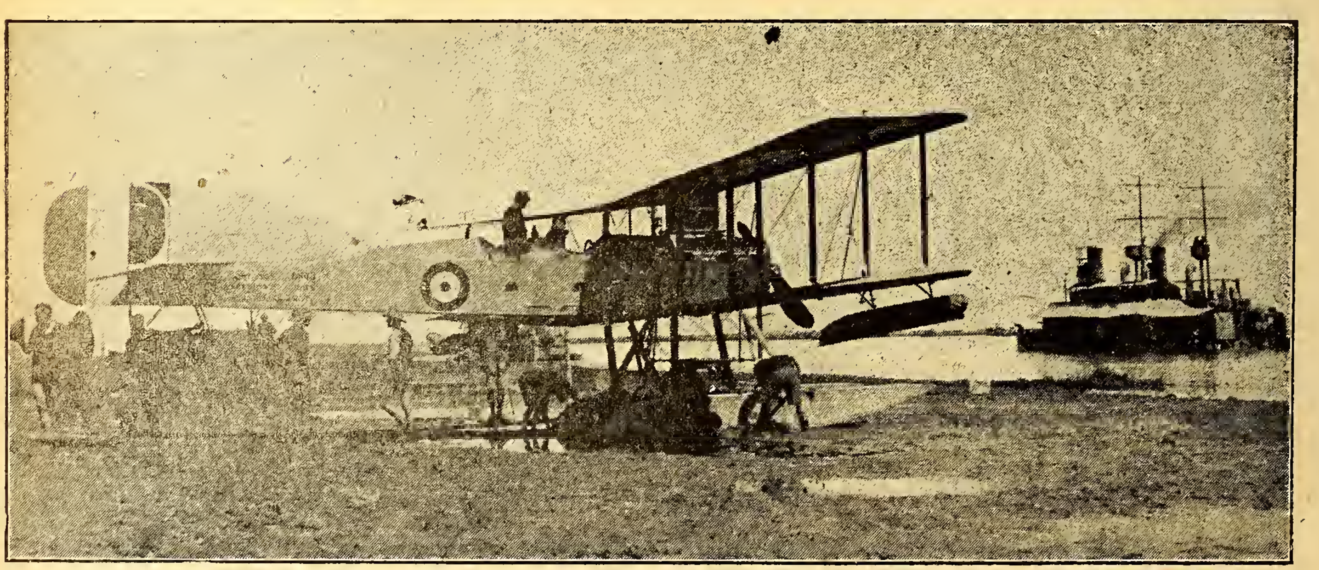
PORTER.—An inquest was held at Wandsworth on Jan. 8th on Sub-Lt. George Horsley Porter, R.N.V.R., attd. R.N.A.S., aged 24, of Bowes Park, who was formerly in the London Rifle Brigade, and was gassed in France in May, 1915.

It was stated that for a "rag" others at the Roehampton R.N.A.S. officers' quarters disarranged Mr. Porter's bed, and on finding this had been done he accused Sub-Lt. Rogers of having done it. Mr. Rogers denied it. The matter led to a dispute and a challenge by Mr. Porter to fight. They squared up and closed, but after a scuffle lasting only about 20 seconds Mr. Porter reeled on to a bed. It was seen that something was wrong, and artificial respiration was tried, but unsuccessfully. Mr. Rogers said that he did not want to fight, because Mr. Porter looked so queer. He did not strike him at all, but put his hand up to prevent him rushing at him, and felt his hand in his face. He had no ill-feeling towards his opponent, and they were always having "rags" together. He thought that Mr. Porter was in too bad a humour on this occasion to take a joke. The jury, who returned a verdict of natural death, exonerated Mr. Rogers, and expressed the opinion that he acted like a gentleman.

ENGAGEMENT.

OLIVER—GRANT-SUTTIE.—A marriage has been arranged and will shortly take place between Squadron Commander Douglas A. Oliver, D.S.O., R.N., and Miss Sheila Grant-Suttie.

The official notification that Flight Lieut. Vereker, R.N., and Lieut. Hibbard, R.N.V.R., are missing is the complement to the German communiqué of Jan. 2nd, stating that a British



(Official Photograph.)

A Short Seaplane, with Sunbeam engine, somewhere in Mesopotamia, with river gunboats, stated officially to be guarding the Naval Air Station.

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"super-aeroplane" had fallen into the hands of the German troops.

It appears that on the day in question these officers, accompanied by three air-mechanics, left England for an R.N.A.S. station in Flanders on a Handley-Page twin-engined biplane, with two Rolls-Royce engines. Lieut. Vereker had frequently flown to Flanders before, and was an experienced pilot of this type of machine, so one can only suppose that owing to misty weather he overshot his mark and landed on the wrong side of the lines.

Everyone will sympathise with the captured crew, especially with the pilot, who is a most promising young officer. Lieut. Hibbard is well known to many people in the R.N.A.S., having been stationed at Isle of Grain and at Kingsnorth, where he was immensely popular. Though over military age, he joined the Service very early in the war in the highest spirit of patriotism, and has done much valuable work in the regular course of duty, besides doing a great deal of duty for others out of sheer good nature. One wishes the crew as little unpleasantness as possible during their stay in Germany.

On the other hand, one can have little sympathy with an administrative department which sends machines of new and valuable types across the Channel for experimental purposes. After the lesson of the R.F.C.'s first de Havilland, which was shot down the day after its arrival; after the F.E.2d. with the first Rolls-Royce, which Mr. Littlewood landed in German territory direct from England; and after the first French flying-boat fitted with a Hispano-Suiza engine, which alighted off Ostend in mistake for a friendly port and was courteously towed ashore by Huns, one would have imagined that even the R.N.A.S. Administration would have realised that the proper thing to do is to try new machines thoroughly in England, and then send them abroad in quantities in full fighting trim, straight into action, so that they come as a surprise to the enemy.

As it is, new type machines either go straight over the enemy lines, where they are seen and examined and gauged as to performance by enemy aviators, or they hang about on the aerodromes in Flanders, where they are seen by spies. One can only hope that the new Command of the R.N.A.S. will change this state of affairs before many weeks have passed.

* * *

It is reported by the "Times" correspondent with the Roumanian Army that about Dec. 20th a successful fight in the air was fought by a British aviator, Flt. Lt. Jacob, who, on a Nieuport scout, brought down (near Braila) a German two-engined battleplane. Two of the crew of the enemy machine were killed, and the third was taken prisoner. By the special wish of the King, Col. Thomson, British Military Attaché, presented Flt. Lt. Jacob on Jan. 5th. The King handed personally to the young aviator the highest Roumanian order, that of Michael the Brave, and congratulated him on his bravery, expressing his joy that an Englishman should be the first foreigner who had received this high order.

* * *

The Food Controller may be interested in a cryptic message from the R.N.A.S. in Flanders, to the effect that the threat of meatless days does not appal the personnel in that war area, as they already have a sufficiency of lamb and bacon to last a lifetime, though they could do with a little more beef and brains. Just why the Admiralty commissariat should specialise on immature or highly preserved commodities while, apparently, omitting to provide adequately those which have built up the British Empire, is not clear. And, of course, the whole thing may be only a joke perpetrated by these aerated sailor-folk, and quite incomprehensible to the mere landsman at home.

MILITARY.

Jan. 5th, 8.36 p.m.—There was considerable aerial activity yesterday. Successful work was carried out by our aeroplanes in communication with our artillery. Two of our machines are missing.

Jan. 7th, 8.40 p.m.—On the night of the 4th-5th inst., and again yesterday, our aeroplanes attacked with bombs a number of places of military importance behind the enemy's lines and obtained good results. Much successful work was carried out during the day in co-operation with our artillery.

Jan. 8th, 8.35 p.m.—Yesterday a number of enemy batteries were effectively engaged by our artillery in co-operation with our aeroplanes.

Many places of military importance behind the enemy's lines were successfully bombed, and a number of fights took place in the air.

Two enemy machines were driven down in a damaged condition.

Two of our machines are missing.

The Casualty List.

Reported Jan. 3rd.

Killed.—Brown, Lieut. C. A. F., R.F.C.
Nason, Capt. J. W. W., R.F.C.
Wounded.—Hubbard, Sec. Lieut. W. H., R.F.C.
Missing.—Arnold, Sec. Lieut. H. E., R.F.C.
Insoll, Sec. Lieut. F. N., R.F.C.

Reported Jan. 4th.

Killed.—Parker, Lieut. C. W. H., Worc. Regt., attd. R.F.C.
Died of Wounds.—Smith, Sec. Lt. E. F. W., Leinster Regt., attached R.F.C.
Wounded.—Dicksee, Sec. Lt. H. J. H., R.F.C.
Freemantle, Sec. Lt. R. P. C., R.F.C.
Gould, Capt. J. R., Cavalry, Special Reserve, and R.F.C.
Jones, Sec. Lt. L. F., R.F.C.
Masters, Sec. Lt. G. A., London Regt. and R.F.C.
Carmichael, 21271 2nd Cl. Air Mech. A. (Buenos Aires), R.F.C.
Missing.—Lewis, Sec. Lt. E. L., Essex Regt. and R.F.C.

Reported Jan. 5th.

Wounded.—Morkham, Sec. Lt. J. P., Northampton Regt. and R.F.C.
Missing.—Spanner, Capt. H., R.F.C.

Reported Jan. 6th.

Killed.—Taylor, Sec. Lt. D. J., R.F.C.
Previously Reported Missing, now Reported Missing, believed Killed.—Pulleyn, Sec. Lt. J. L., Dorset Regt., attd. R.F.C.
Wounded.—Smith, Capt. A. H., R.F.C.

Reported Jan. 8th.

Died.—R.F.C.—Murphy, 18390 2nd Cl. Air Mech. J. (Lavender Hill, S.W.).

Reported Jan. 9th.

Killed.—Clark, Lt. E. F., E. Kent Regt., attd. R.F.C.
Robertson, Lt. J. K., R.F.C.
Died.—Mason, 18298 2nd Cl. Air Mech. C. F. (Sydenham, S.E.), R.F.C

PERSONAL NOTICES.

Deaths.

BROWN.—Lieut. Claud A. Felix Brown, R.F.C., killed on Dec. 26th, aged 21 years, was the elder son of Mr. and Mrs. Ernest Brown, of Leecroft, Leeside Crescent, Golders Green, and formerly of Merok, Woodside Park. Educated at Highgate School, he enlisted at the outbreak of the war in the London Rifle Brigade, and proceeded with the 1st Battalion to France. He was invalided, suffering from shell-shock, at Christmas, 1914, returning again to the front in February, 1915. He received his commission in the spring in the West Yorkshire Regt., and shortly afterwards served at Gallipoli, being attached to the Lancashire Fusiliers. He was admitted to hospital in Alexandria at Christmas, 1915, and in the following spring was transferred to the R.F.C., and was later promoted to the rank of Lieut.

* * *

CLARK.—Lt. Eric Clark, R.F.C., has been killed at the front, aged 20 years. He was the eldest son of the Mayor of Maidstone (Councillor G. Foster Clark), and had previously served in France with The Buffs. He was educated at Mill Hill.

* * *

FATT.—An inquest was held on Jan. 6th on the body of Lt. William Mabberley Fatt, 24, R.F.C., who was killed in an aeroplane accident on Thursday. A verdict was returned that death was due to burns, but that there was no definite evidence to show what caused the machine to fall.

* * *

GORDON.—Sec. Lt. Bernard Vernon Gordon, R.F.C., killed, was the youngest son of the late Mr. Thomas Gordon, and Mrs. Gordon, of Sevenoaks and Eastbourne. He received his commission on leaving Eastbourne College.

* * *

McGWYRE and WILKES.—A Kent. coroner's jury on Jan 4th found that the deaths of Lieut. McGwyre and Serg. Wilkes, R.F.C., who were killed on the previous day, was due to misadventure. Their machine, which was a new one, and had passed a satisfactory test, fell from a height of nearly 1,000 ft. The petrol ignited and the bodies were much burned. According to expert opinion the pilot turned too suddenly and so lost control.

* * *

NASON.—Capt. and Flt. Comdr. J. W. W. Nason, Royal Sussex Regt. and R.F.C., killed on Dec. 26th, aged 27, was the son of the late C. St. S. R. Nason, M.A., M.D., of Corse Grange, Gloucester, and Mrs. Nason, of 23, Grosvenor Crescent, St. Leonards-on-Sea. He joined the Army on the outbreak of war, and received his captaincy in November, 1914, transferring to the R.F.C. in January of last year. He first played for the Sussex County XI. at the age of 17, and received his Blue at Cambridge on his third appearance for the University—earlier than it had ever been awarded before—appearing against Oxford in 1909 and 1910. He also played for the University at Association football. He played for the Gloucester County XI for two seasons. Capt. Nason was also a fine golfer, having a handicap of plus 2 at Cooden Beach.

PARKER.—Lieut. Cecil W. H. Parker, Worcestershire Regiment, attached R.F.C., killed, was the elder son of the Rev. W. H. Parker, Vicar of St. Peter's, Birmingham. Born in 1894, he was educated at Edgbaston Preparatory School and King Edward's High School, Birmingham (1905-1914), where he obtained a scholarship. He won a cadetship at Sandhurst in 1912, but was refused on account of insufficient chest measurement. On leaving from the first class he was, in May, 1914, commissioned second lieutenant in the Special Reserve to the Worcestershire Regiment. He went to France in October, 1914, was in the first battle of Ypres, where the Worcestershires were specially mentioned by the Commander-in-Chief; was selected for service in the Cameroons, February, 1915; and was on the "Falaba" when she was torpedoed. After nine months' home service he returned to the front in March, 1916, took part in numerous engagements, in which he was for some time acting captain, and was recommended for distinguished bravery in action by the brigadier-general.

* * *

PLATT.—An aeroplane accident occurred near Wallsend on Jan. 4th, the aviator, whose name is understood to be Platt, a Canadian, being killed. The machine fell from a great height into a field. As it turned over and over a bag fell out, and until it was found it was thought the machine had two occupants. The aeroplane caught fire and was totally wrecked.

* * *

TOWNSEND and BISSICKS.—An inquest was held on Jan. 3rd on the bodies of the two officers whose machine fell in Gloucestershire during a flight on Jan. 2nd. Mr. J. E. Townsend was killed immediately, and Sec. Lieut. Francis Bissicks, who was the observer, died in hospital on Jan. 3rd.

The evidence showed that Mr. Townsend, who was under instruction, had had sufficient experience to fly alone, and he was navigating the machine, and Mr. Bissicks was a trained pilot. There was nothing either in weather or engine conditions to explain the accident. In both cases death was found to be due to accident.

MARRIAGES.

ALSTON—STEWART.—On Jan. 2nd, Cedric Rowland Alston, South Lancs Regt. and R.F.C., eldest son of Mr. and Mrs. Rowland Alston, of 96, West Hill, Sydenham, was married to Margery Lillian, eldest daughter of Dr. and Mrs. H. M. Stewart, of Dyffryn, Dulwich, at St. Stephen's Church, South Dulwich, by the Rev. Oscar Hordman, Chaplain of Dulwich College, assisted by the Rev. F. E. White.

* * *

DUGUID—THOMAS.—On Dec. 30th, Lieut. Alan Duguid, R.F.C., son of Mr. and Mrs. Charles Duguid, of Park Lodge, New Barnet, Herts, was married to Ada Myfanwy, only daughter of the late Mr. John Thomas (Pencerrdd Gwalla) and of Mrs. Thomas, of "Inglenook," Blandford Road, Bedford Park, W., at St. Matthias's, Earl's Court Square, by the Rev. E. T. Williams, M.A.

GOODE—BANKS.—On Dec. 28th, Humphrey Minton Goode, R.F.C., was married to Kathleen Noel, eldest daughter of the late Alfred Banks and of Mrs. Archibald Marshall, at St. Peter's Church, Château d'Oex, by the Venerable Archdeacon Scott, assisted by the Rev. I. Hutchinson, Assistant Chaplain to the British Interned.

* * *

WISE—KNOWLES.—On Jan. 3rd, Lt.-Col. Percival Kinnear Wise, R.F.C., son of Alfred G. Wise, Esq., Valroy, Camberley, was married to Margaret M. B. Knowles, daughter of the late J. B. Close, Esq., and widow of A. B. Knowles, Esq., I.C.S.

ENGAGEMENTS.

ECKERSLEY—GROVE.—An engagement is announced between Lieut. Peter P. Eckersley, R.F.C., youngest son of the late W. A. Eckersley and of Mrs. Shawcross, 15, Belsize Park, and Stella, younger daughter of Mr. and Mrs. J. C. Grove, of Watercroft, Penn, and 92, Sloane Street

* * *

SPENCER—THOMPSON.—The marriage arranged between Lieut. R. H. Spencer, R.A. and R.F.C., and Molly, younger daughter of Major J. W. H. Thompson and Mrs. Thompson, of 2, Southwick Crescent, W., and Bratton House, Wincanton, will take place very quietly early in February.

BIRTHS.

BOWEN.—On Jan. 4th at Nepicar House, Wrotham, the wife of Lt. (temp. Capt.) J. B. Bowen, Yeomanry, attached R.F.C., of a son.

* * *

GAYE.—On Dec. 30th, at a nursing home in London, to Margot, wife of Capt. A. D. Gaye, Bedford Regt. and R.F.C.—a son (still-born).

* * *

HUNT.—On Dec. 30th, 1916, at 5, Connaught Road, Margate, the wife of Sec. Lieut. Keith F. Hunt, Yeomanry and R.F.C. (prisoner of war), of a son (Noel Allison).

* * *

INGRAM.—On Jan. 4th, at Forest House, Westgate-on-Sea, the wife of Capt. Ingram, R.F.C., of a daughter.

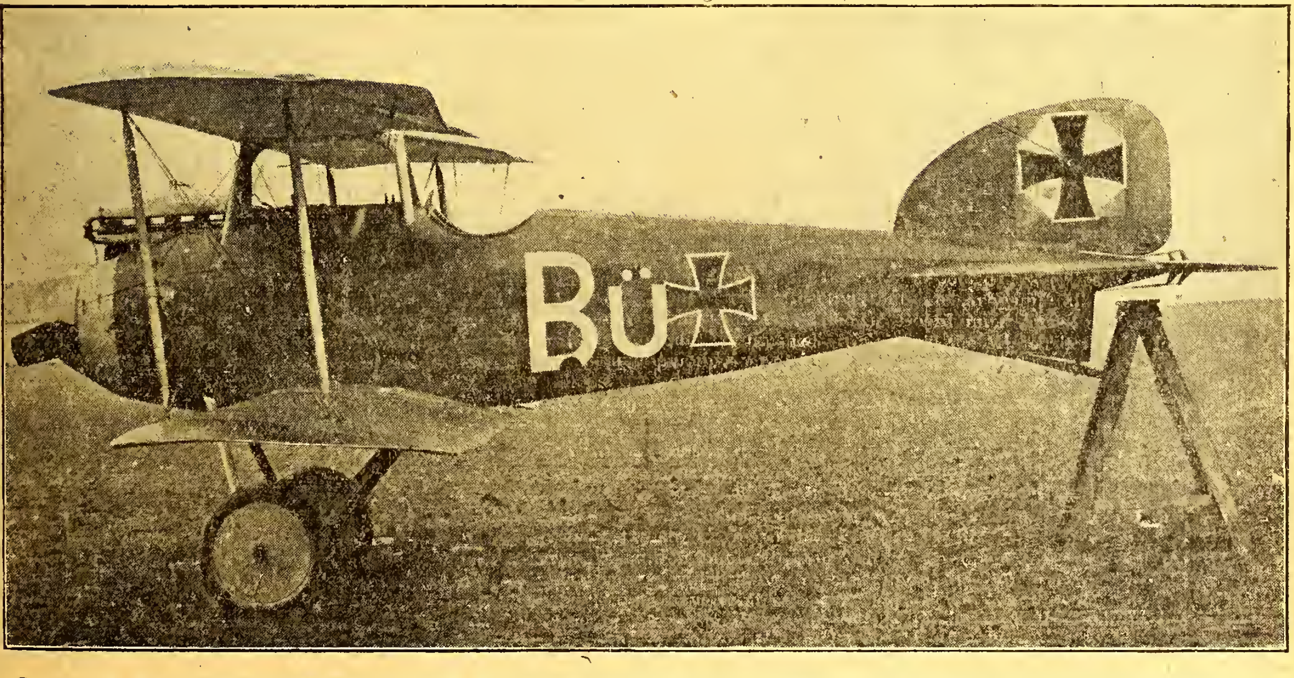
FRANCE.

OFFICIAL COMMUNIQUÉS.

JAN. 4th.—Shortly before 5.30 p.m. a German aeroplane dropped two bombs on Compiègne. A woman was injured. No damage was done.

JAN. 5th.—Last night 20 of our aeroplanes carried out various bombardments. The enemy aerodromes of Matigny, Haucourt, Flez, and Bernes, and the railway stations of Rouilly, Athies, and Villecourt, and the cantonments of Roye received numerous bombs.

JAN. 7th.—On the night of Jan. 4th-5th our bombarding squadrons dropped bombs on the aerodrome of Griselles and the railway station and hutments of Guiscard (south of Ham, on the Somme front), where four fires and several explosions were



One of the new Albatros "Destroyers" which has of late been causing considerable annoyance to the R.F.C. in France. Its characteristics are described on page 152. The peculiar balance of the rudder is noteworthy.

Reproduced by courtesy of "La Guerre Aérienne."

The late Adjudant Barron, one of the most notable French bomb-raiders.

noticed. Last night enemy bivouacs south of Spincourt, the ammunition dumps at the farm of Longeau, and the railway station of Mesnil-St. Nicaize were also bombarded.

On Jan. 5th Sous-Lt. Dorme brought his machine-gun to bear at close range on a German aeroplane. The machine was damaged and was forced to come down in our lines near Auves (? Auve, in Champagne). The pilot and his companion were made prisoners. This is the fifth machine brought down by Sous-Lt. Delorme.

On the night of Jan. 6th-7th one of our squadrons bombarded the aerodromes of Haucourt and Matigny, the railway station of Arcigny, the enemy cantonments in the Bois de Liancourt Fosse, and the depots at Attichy.

GERMANY.

Official Communiqués.

Jan. 2nd.—Front of Duke Albrecht of Würtemberg.—An English super-aeroplane fell into our hands.

Jan. 8th.—In the course of successful aerial engagements, and by means of our anti-aircraft guns, the enemy suffered the loss of six aeroplanes.

* * *

It is reported from Denmark by the "Ribe Stiftstidende" that on December 28th a fire broke out in a Zeppelin shed at Tondern, Schleswig-Holstein. The outbreak was probably caused by a short circuit. Both the Zeppelins in the shed were destroyed.

A further report states that the fire which destroyed the two Zeppelins was the result of a collision between the two airships as they were leaving the hangars.

* * *

In a New Year article on the development of aerial navigation, Colonel von Parseval declares that there is now very little external difference between his system of construction and those of Zeppelin and Schütte-Lanz. The size of airships has considerably increased in order to correspond with the increased useful load and climbing power required. As regards the increase of speed the pleasing discovery has been made that Newton's Law, according to which resistance varies as the square of the speed, does not apply. The difficulty of increasing the speed of an airship is that additions to the weight of the frame are not compensated by proportionate increase of the carrying capacity of the ship—a fact which must ultimately limit it increase in size. He adds :—

The chief duty of our airships is reconnaissance over the North Sea. In this aeroplanes cannot take their place, since they, and in particular seaplanes with their heavy floats, can remain in the air so comparatively short a time, and obviously cannot accompany the Fleet independently as airships can, but need special mother-ships. In this respect the German fleet is at present superior to its adversaries.

Colonel von Parseval concludes, somewhat irrelevantly :—

When peace comes the learned will eagerly study and write and draw interesting conclusions in important books, while the ignorant will tell of the great pilot Bölcke who overcame 40 adversaries before he met a malignant fate.

RUSSIA.

Official Communiqués.

Jan. 3rd.—Enemy aeroplanes have displayed considerable activity and have dropped bombs at various points. One of the machines was brought down by our artillery fire near the village of Iva (south-east of Lake Vishnevsk). The aviators (an officer and a private) were taken prisoners.

In the region of Porskaia Vulka (22 miles south-east of Kovel) our aviators brought down two enemy aeroplanes. Both the machines were smashed, and the four aviators killed by the fall.

Jan. 8th.—Our aviators dropped bombs on Kovel, in the village of Goloby (20 miles south-east of Kovel), the station of Zablotze (west of Brody) and the hamlet of Jasionow (south-west of Brody).

ITALY.

Official Communiqués.

Jan. 2nd.—Hostile aircraft attempted raids on the Sette Comuni plateau, on the Sugana Valley, and on the Carso. One enemy machine was brought down behind the enemy's lines by the fire of our anti-aircraft batteries.

Jan. 8th.—On the Trentino front there have been reconnoitring and aerial flights.

During the night of Jan. 5th-6th an Italian aeroplane flew over Trieste and returned along the coast. Two hundred kilograms (four cwts.) of explosives were dropped upon the station at Nabresina and in the region of Mont Querceto (Hermada). The aeroplane safely returned to its base in spite of violent fire from the enemy's batteries.

BULGARIA.

Official Communiqués.

Jan. 6th.—Near Ghevgheli (Doiran front) we brought down a hostile aeroplane, the British pilot of which was made prisoner.

GREECE.

It is reported from Greece that a Zeppelin appeared over Larissa on Jan. 3rd. It dropped 15 mail bags and then left. The mail bags are reported to contain correspondence from the interned Greek army Corps at Görlitz. The reports of aerial communications with Germany were current for some time past. The Royalist paper "Hesperini" now confirms them by the above account published in its columns.

HOLLAND.

The "Handelsblad" stated on Dec. 28th that a German aeroplane was obliged to descend at Nymegen owing to the motor catching fire.

The machine fell on to the roof of a house, which was damaged. The two occupants, one of whom was an officer wearing the Iron Cross of the first class, were injured. Immediately after descending from their machine they were taken to the officer commanding the garrison.

BELGIUM.

The "Telegraaf's" frontier correspondent reported that on Dec. 27th a squadron of aeroplanes appeared above Zeebrugge at 11.30, and remained till past mid-day. People in the vicinity heard the reports of exploding bombs, and observed that the raiders were subjected to a brisk bombardment from the coast near Zeebrugge.

EGYPT.

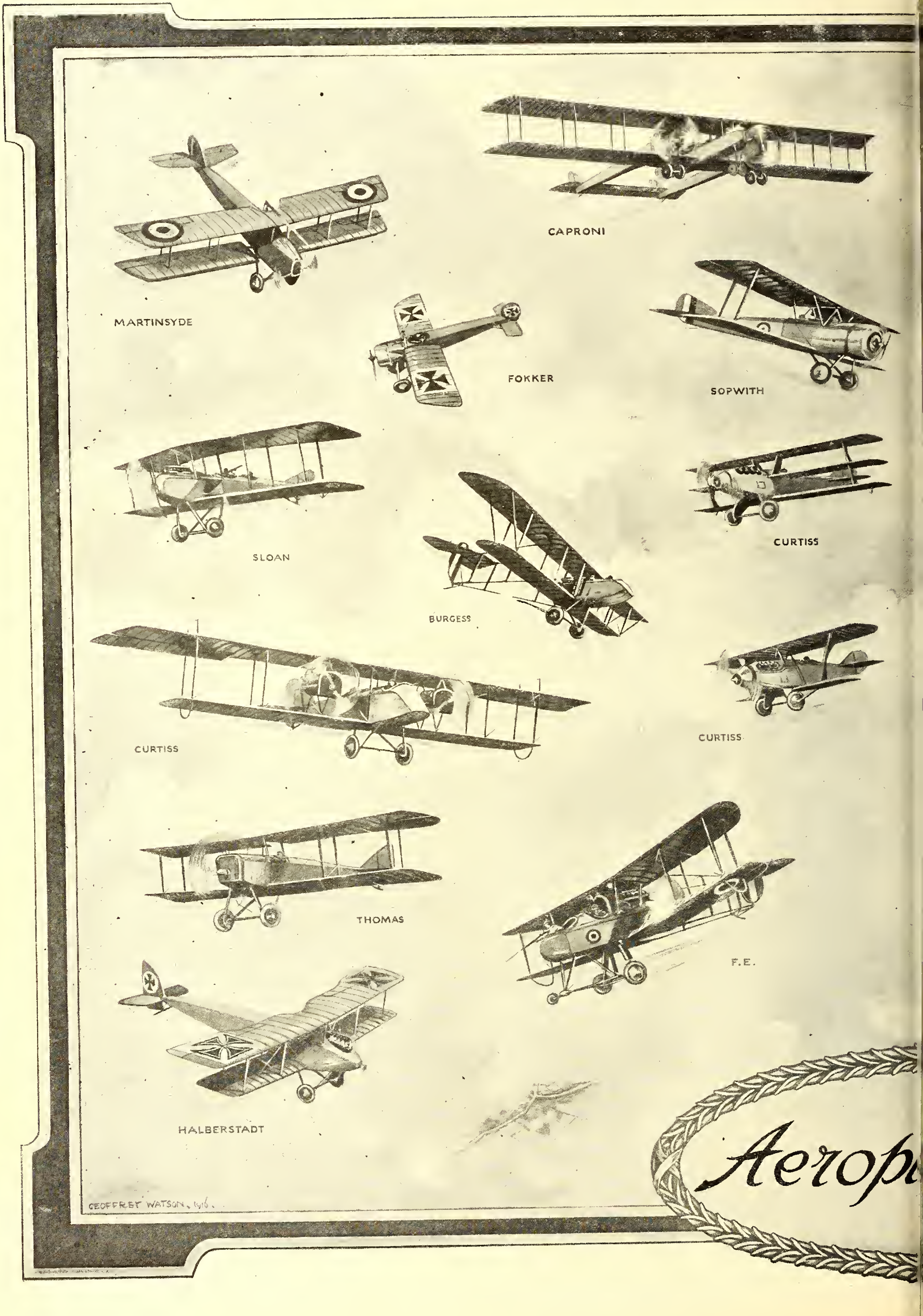
It was reported from Cairo on Dec. 4th that during the recent raid, when the hostile aviator appeared over Heliopolis, where the Sultan was staying, the guard at once hauled down the flag and struck the tents of the Sultanīya bodyguard encamped round the palace.

The Sultan immediately on learning of these precautions ordered that the flag should be hoisted and the tents again pitched. This example of fatalism has been most favourably commented upon by the Sultan's subjects, who, as good Moslems, are firm believers in predestination.

MACEDONIA.

Writing from Salonika on Dec. 24th, Mr. G. Ward Price says :—

There has been a very distinct increase in the numbers and activity of the enemy aeroplanes on our sector of the Balkan front, which has lately been extended, and now, indeed, is actually longer than the line held by the British troops in France. Our own aviators, who, both naval and military, have always been very active, are now occupied much more than was the case until recently in keeping down the enemy's machines. One of these is reported to have been destroyed to-day, and


CAPRONI
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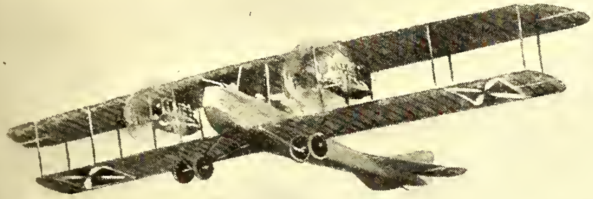
THOMAS
F.E.
HALBERSTADT
Aerop
GEOFFREY WATSON, 1916.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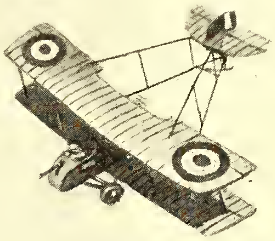
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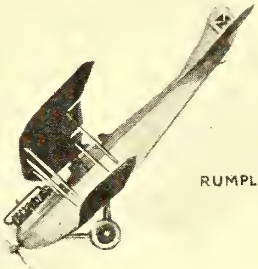
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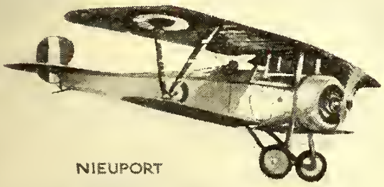
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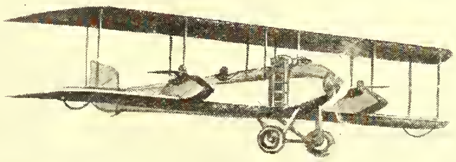
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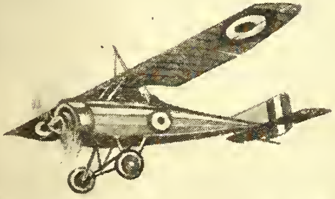
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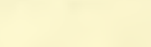

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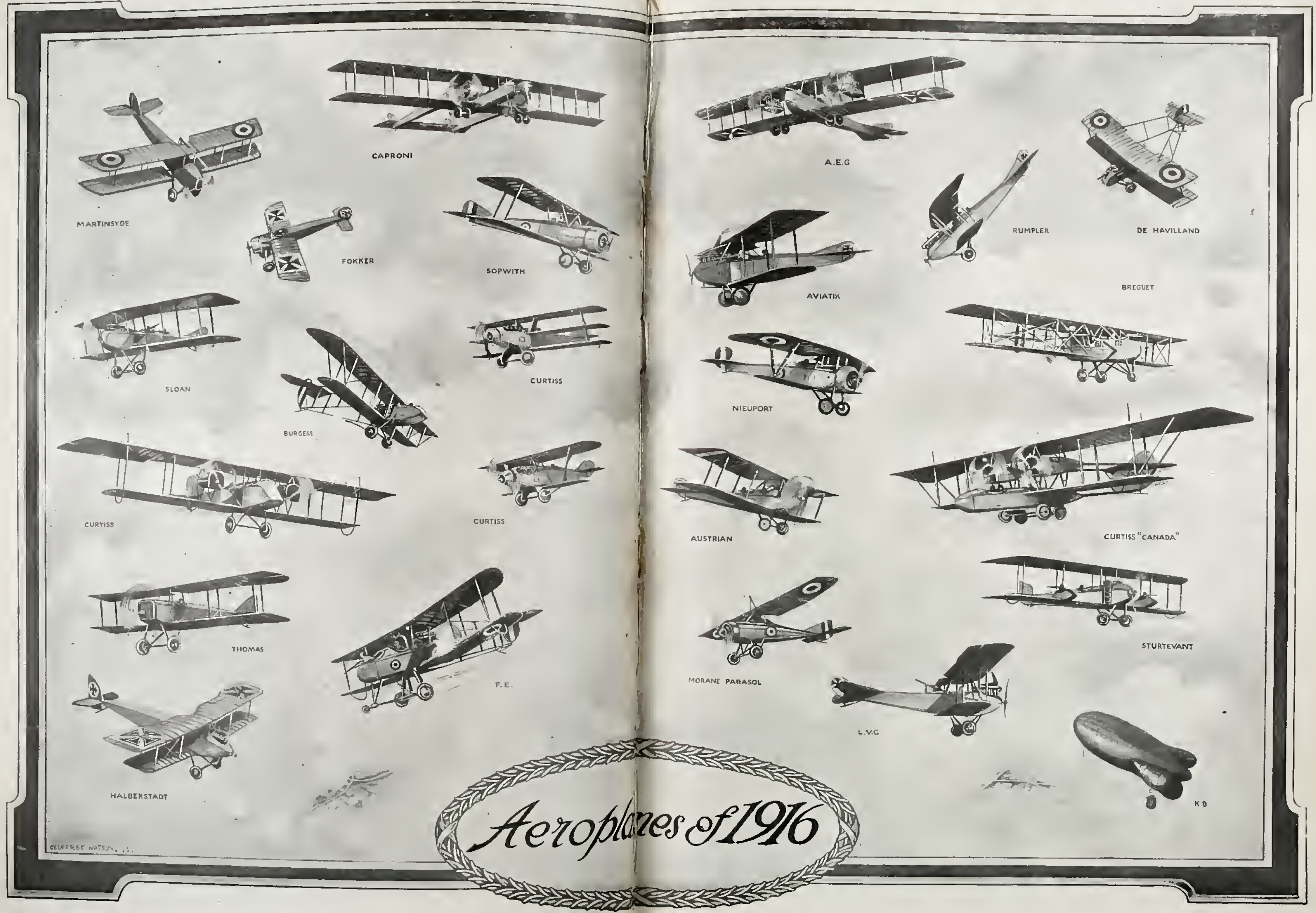
Aeroplanes of 1916



another obliged to land. Our seaplanes have made a raid on Xanthi Station (on the eastern frontier of Macedonia), and have bombed rolling stock there.

Bad weather is holding up all war operations in Macedonia, but if fog and bad weather prevents operations on land, it does not hinder the Allied aviators from raiding important bridges on the Trans-Balkan Railway line. The big bridge near Adrianople had nearly half a ton of explosives dropped on it lately, so that although the Germans still control the railway, their use of it is considerably hindered.

* * *

The "Times" special correspondent at Salonika reports on Dec. 21st that the Germans are striving hard to regain the ascendancy in the air, which they had so completely lost from the beginning of September to the end of November. They have increased the number of their aircraft by the addition of several aeroplanes of the newest types, each carrying two machine-guns, and now once more they are crossing our lines with comparative impunity.

Four days ago one of these machines dropped a bomb close to a British lorry loading stuff for the Serbians by the roadside. The explosion only slightly damaged the lorry, but killed three of our Bulgarian prisoners, who were engaged in loading it. The British driver and his assistant were uninjured.

U. S. A.

It is reported from Washington that the United States Post Office is making plans for an elaborate postal service by aeroplane.

The schemes under consideration include services between New York and Chicago and between Washington, New York and Boston.

A statement issued by the Department says that an air mail service is entirely feasible. Trips between New York and Chicago, a distance of about 720 miles, can be made in about eight hours, and from 500 to 1,000 lbs. of mail can be carried on each trip.

According to present plans as indicated by Mr. Glenn Muffly, one of the organisers, the Chicago-New York night service will be carried out by double-motored biplanes, and the distance will be divided into four sections of 180 miles, with three stops.

Petrol and oil will be taken in at the first stop; at the second stop, where three complete machines and three pilots will be stationed, the mail will be transferred to a new machine, the second pilot finishing the journey. At no time will a machine be over 11¼ miles from an emergency landing station. At each emergency station there will be two searchlights of about 8,000 candle-power, with parabolic reflectors. One of the lights will point east and one west, both elevated 15 or 20 degrees from the horizontal.

The pilot will correct his compass for drift caused by side-winds as he passes over each station, and in the few minutes between stations he can fly by the compass, with the assurance that he will pass over the next station, or near enough to see the light, even in the densest fog.

The aeroplanes will carry lights on their wing tips to avoid collision. Coloured lights will be used, as on boats, so that other fliers will know at once in which direction the machine is going. A small searchlight will be mounted on each plane for use only in landing at emergency stations. The regular landing stations will have the ground illuminated.

* * *

The following letter has been received from the Connecticut Aircraft Co., New Haven, Conn., U.S.A.:—

"Being subscribers to The Aeroplane, we notice in your issue of November 29th, on page 1058, an article relative to the dirigible DN—1 for the U.S. Navy, manufactured by this Company.

"For your information we wish to state, and trust that you will publish same at once, that the dirigible DN—1 of the non-rigid type has recently been finished and completed at our plant here at New Haven, Connecticut, U.S.A. This dirigible passed very successfully its preliminary power plant tests. It was impossible to make the flying tests here at our plant due to our not having at present hangar facilities.

"The dirigible was shipped two weeks ago to Pensacola, Fla., U.S.A., to undergo at that point its flying tests. We expect shipment to arrive at its destination either to-day or to-morrow, when the crew will be sent and the dirigible properly erected and inflated. There has never been any attempt made as yet to make an ascension in this dirigible, as its gas-bag has never even been inflated with hydrogen gas.

"There is no doubt in our minds but that, even though this dirigible marks the pioneering venture in this country on non-rigid dirigibles, it will fulfil our expectations and live up to the requirements of the U.S. Government to the letter.

"I trust that you will properly give this announcement official notice in your next issue of The Aeroplane, and sincerely hope that in the future you will write this Company regarding any of its products before publishing any articles in your weekly regarding same.

"We are the only Company in America to-day building lighter-than-air craft exclusively, and the first Company to actually produce and deliver to this Government for training purposes a dirigible of the non-rigid type. We consider your publication a very valuable one, and get considerable pleasure in reading same every week."

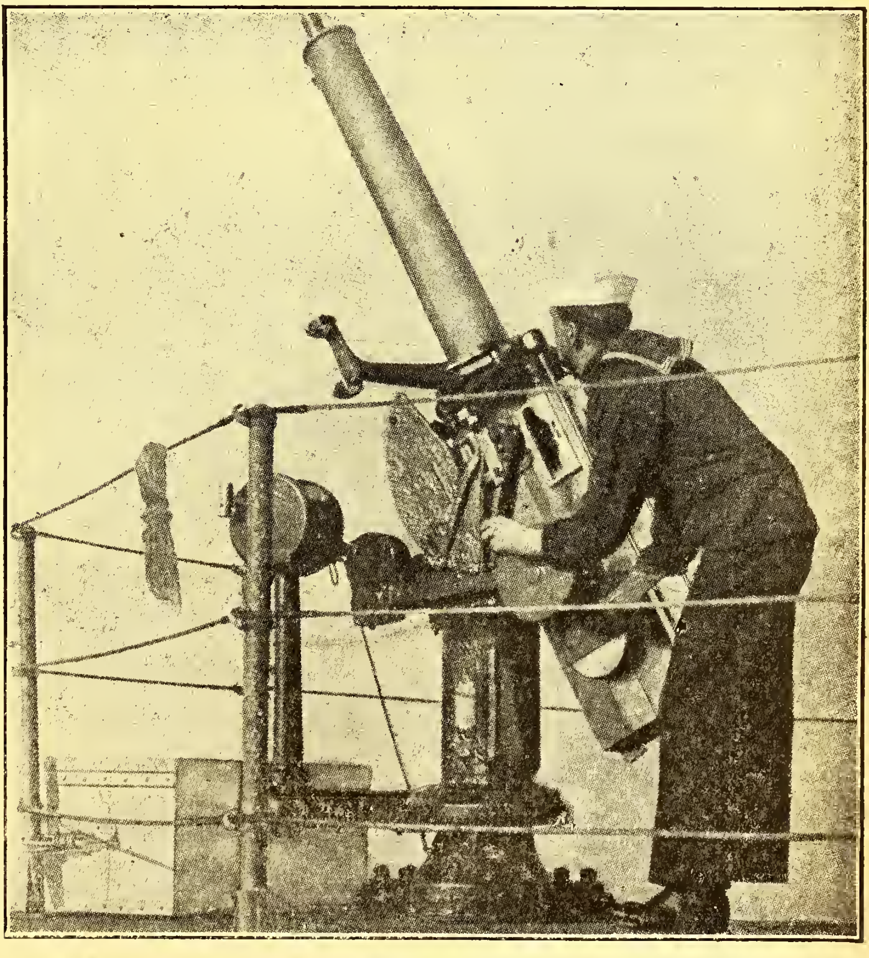
[The remarks made in The Aeroplane were not intended to cast the slightest aspersion upon the constructors of the airship. The onus for the design and specification naturally rests with the U.S. Admiralty officials, and no one questions that the workmanship and quality of material put into the airship by the Connecticut Aircraft Company is of the best. Only U.S. Navy Department methods seem nearly as dilatory as those of the British prototype.—Ed.]

THE ROYAL FLYING CORPS CLUB.

The Royal Flying Corps Club, whose premises are in Bruton Street, Berkeley Square, was opened on Jan. 4th. The club has been founded by Mr. W. C. Bersey, on the suggestion of Mrs. Henry Allhusen, who is well known for her work in connection with the Royal Flying Corps Hospital in Bryanston Square, for the officers of the Corps, and has been equipped throughout with every possible comfort.

There are a number of bedrooms for the use of the members, and preference will be given to officers on sick leave.

All Officers serving in the Royal Flying Corps, employed in the directorates of the Royal Flying Corps, Aeronautical Inspection Department, and officers of the Territorial unit of the Royal



Reproduced by courtesy of "Aerial Age," New York.

One of the new Anti-Aircraft Guns brought into use by the United States Navy.

Flying Corps are eligible for election as temporary or permanent members, and the subscription for 1917 has been fixed at two guineas. The chairman of the executive committee is Lieut.-General Sir David Henderson.

Other members of the executive committee are Brigadier-Gen. Salmond, Lieut.-Col. W. W. Warner, Lieut.-Col. Holt, Lieut.-Col. C. F. Lee, Mr. Bersey. and Mr. Percy Simmons, whilst the Club committee consists of Brigadier-Gen. W. S. Brancker (chairman), Lieut.-Col. W. W. Warner, Lieut.-Col. C. F. Lee, Major E. G. R. Lithgow, and Capt. H. Tomlinson, M.C. The secretary is Major R. W. Morley.

One wishes the new club every success in its effort to provide for the young officers of the R.F.C.

THE ADMINISTRATION OF THE FLYING SERVICES.

The following letter to the editor of the "Times" is worthy of serious attention, albeit one regrets a certain disappointed tone which hardly accords with Lord Sydenham's Service experience :—

Sir,—Your Aeronautical Correspondent has correctly described the contemplated changes in the administration of the Air Services as I understand them ; but he has refrained from drawing attention to some points of special importance. I note that he states that "various arguments were adduced to show that the existing plan was now working so well that it would be a mistake to change it." This is not the case. Great changes were proposed, which could have been carried out without the least dislocation, and which had the complete approval of all the experts of both Services.

The main consideration which determined the decision of the late Board was based upon the peculiar position of the Air Services in regard to supply. The whole air matériel is still in what may be called an experimental state. It has changed almost radically since the war began. It must, probably for some years, remain in the stage of development, and rapid progress must be maintained if we are to hold our own in face of an enemy who thoroughly understands how to bring science and experience to bear upon aircraft with the least delay.

It is an axiom that, where material of war is in a state of almost daily development, invention, experiment, touch with the Services at the front, design, and manufacture should be maintained under a single authority. There is a striking instance of the application of this principle in the past.

So long as our submarine mine equipment was in the stage of development, supply in every sense was retained in the hands of the directing head. As soon as development ceased, and the material was standardised, supply passed to the ordnance branch of the War Office. In accordance with this principle, the French have kept the manufacture of aircraft out of their very efficient Ministry of Munitions, and in consequence they have been markedly successful in dealing with supply. The Germans, who understand these matters, would not give a moment's consideration to the excessively complicated arrangements which seem to have been approved.

Your Correspondent states that "the idea appears to be that the Air Board shall design the machines and that the Ministry of Munitions shall make them." This is well known to be a thoroughly unsound system, and "the obvious objections" are to be got over by mixing two Departments in one building. It was said some years ago that a man cannot "serve two masters," and propinquity cannot remove the administrative difficulties thus created.

Moreover, design will, I trust, be largely dealt with by the manufacturers, whose experience and knowledge have been utilised by the R.N.A.S. with excellent results. The Air Board must, therefore, maintain direct and personal communication with the manufacturers, who also will have to serve two masters, which they will find to be distracting.

Your Correspondent speaks of "a pooled Inspection Department," which sounds attractive, but is clearly unattainable under the new arrangements. The Air Board must have its own inspectors to pass the finished articles, and the Ministry of Munitions must have another set of inspectors working in the manufacturers' shops.

The Air Services have been proved to be vital to the needs of the war. Speed in introducing constant changes in equipment is essential. Under divided responsibility and incomplete authority delays are certain. At a crisis in the war a radical reconstruction of the whole of the administrative arrangements of the Air Services is necessarily fraught with grave risks; but no one, reading your Correspondent's article, will realise how great is the revolution implied. Nor will it be understood that all the drawbacks which have reacted upon the Air Services in the past would have been smoothly and simply removed by the adoption of the proposals at which the late Air Board arrived after long and careful study.

There are many other points of great importance which cannot be dealt with in a letter. I earnestly hope that the new arrangements will fulfil all expectations; but they flagrantly violate the principles of administration which I have learned in nearly 45 years of service under three Departments of State.

I am, Sir, yours obediently,

Jan. 5th. **Sydenham.**

A CRITIC OF THE CRITICS.

An article which appeared in the "Pall Mall Gazette" of Jan. 3rd deserves a certain amount of mention, if only because that paper is read in the majority of London clubs, and may convey an entirely erroneous impression to a number of estimable gentlemen possessing considerable social influence. It is also an example of the methods adopted by reactionaries the world over when reformers have carried their reforms to a satisfactory issue.

The article in question, which purports to come "from an aeronautical correspondent," while acclaiming the advent of an Air Minister, proceeds to scoff at the agitators through whose efforts the Air Ministry has come into existence. The manner of the article may be gauged from the following quotation :—

> "On general questions affecting the Service airmen speak their minds quite frankly and with a breezy freshness, natural perhaps to those who spend so much of their time in the free air of heaven, that is refreshing and exhilarating. The ears of many of the theoretical and inexperienced would-be reformers of the Air Service would tingle and burn if they could only hear the caustic criticisms of these practical and experienced knights of the air.
>
> "Palpable Ignorance.
>
> "It would be impolitic and impolite specifically to mention the names of these agitators, for flying men laugh at their palpable ignorance and hold them in contempt. They go further and declare that many of these frothy agitators have an axe to grind, and, trading on the ignorance of the public in regard to aviation, advocate this, that, and the other impossible reform, solely for the sake of self-advertisement and the chance of gaining a fictitious reputation as experts.
>
> "Airmen deny most emphatically many of the stories in circulation respecting constant and burning friction between the Admiralty and the Air Service, and say that others with some foundation in fact are greatly exaggerated."

One commends to the "expert" who is responsible for the article some inquiry into his subject before he commits himself to such definite statements. He might, for instance, inquire—if his sources of information go so high—concerning the state of mind, not to say manners, in which the last meeting of the Air Board dissolved, and he might further inquire into certain of the transactions between their Lordships of the Admiralty and the Air Department as such.

His loose use of the words "Air Service" leaves one somewhat in doubt as to whether he refers to the Flying Services together, or to the Royal Naval Air Service specifically, but as considerable friction undoubtedly did exist both between the Admiralty and the Air Department (R.N.A.S.), and between the R.N.A.S. authorities and the R.F.C. authorities, his statements are equally untrue in either case. He might note in future that the only "Air Service" is the R.N.A.S., military aviation being the affair of the Royal Flying Corps.

A little farther on he says :—

> "What with Commissions, Committees, inquiries, and other circumlocutory processes, they (the agitators) wasted a lot of the time of the airmen, who were always being called away from their duties to give evidence on some silly, trivial point."

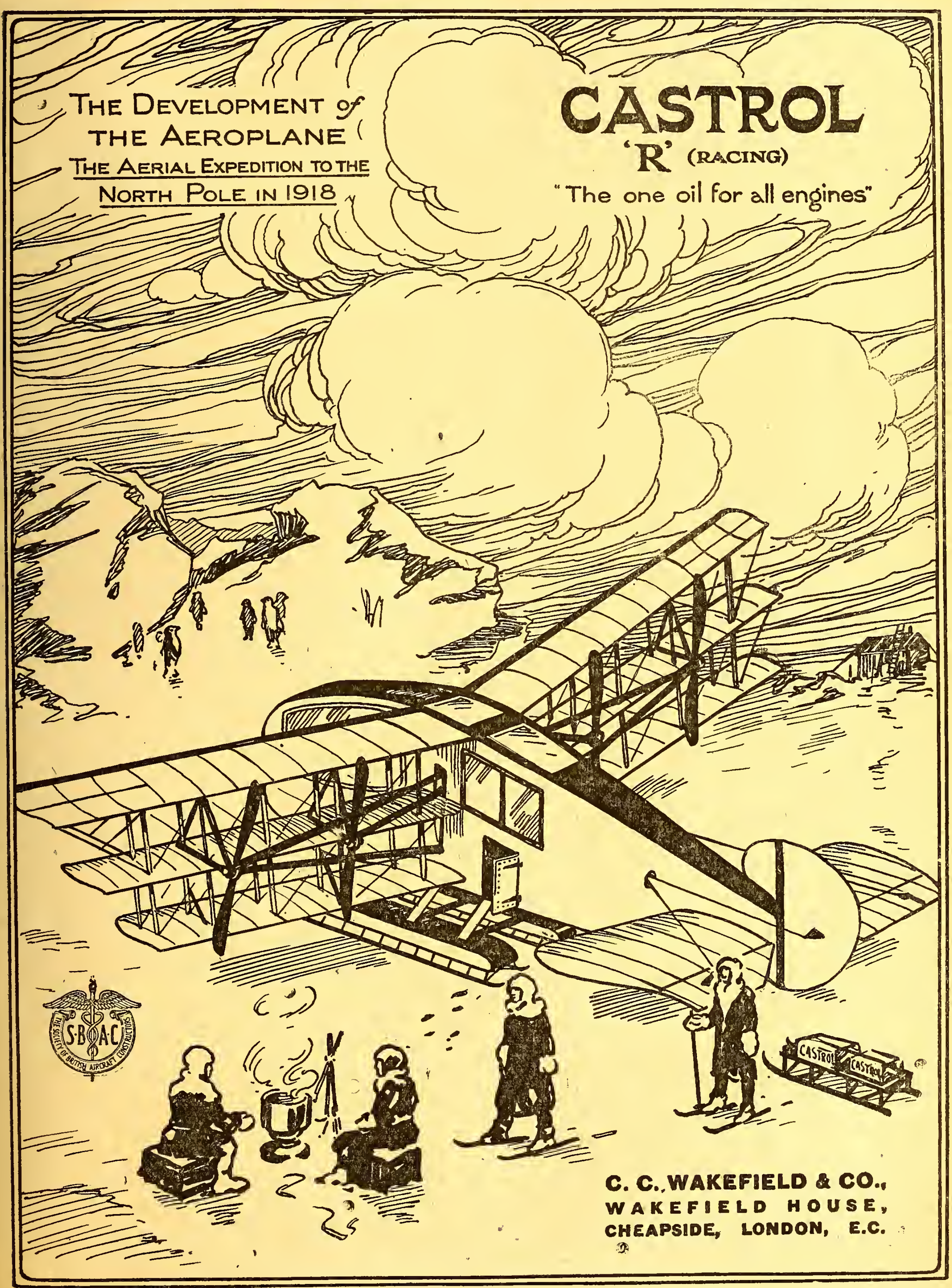
Again, he would do well to learn a little more of his subject, because, as a matter of fact, hardly any "airmen"—that is to say, actual aviators—have had anything to do with any of the "Commissions, Committees, inquiries," and so forth, most of these functions having been attended by officers who do little or no flying, and whose administrative work carries on perfectly well, if not better, in the hands of juniors while they are endeavouring to settle larger subjects. The fact that so many reforms advocated both by the Air Board and by the Judicial Committee in the Royal Flying Corps have been carried out, is sufficient justification, not only of the Board and Committee, but of the critics whose statements brought about these recommendations, as well as causing the Air Board and the Judicial Committee.

Finally, this "aeronautical expert" says :—

> "The heartiest co-operation, as well as a healthy, generous rivalry, exists between the R.F.C. and the R.N.A.S., and, they declare, the public know nothing of the many occasions on which the two Services, in times of critical moment, have played into each other's hands, just as two players, anxious only for their team's success, will do on the football field."

At any rate he speaks the truth to an extent here, because individual officers of the R.N.A.S. and the R.F.C. are frequently friendly when they meet, and where R.N.A.S. units have been attached to the Army on active service undoubtedly the co-operation has been whole-hearted and very fairly successful, as witness the number of mentions of Naval aviators in Military dispatches.

At the same time that does not alter the fact that there should never have been any need whatever for Naval land-going machines to be attached to the Army, because in the first place land-going


THE SOCIETY OF BRITISH AIRCRAFT CONSTRUCTORS
S·B·A·C
CASTROL
CASTROL

THE DEVELOPMENT of
THE AEROPLANE
THE AERIAL EXPEDITION TO THE
NORTH POLE IN 1918

CASTROL
'R' (RACING)
"The one oil for all engines"

C. C., WAKEFIELD & CO.,
WAKEFIELD HOUSE,
CHEAPSIDE, LONDON, E.C.

Naval machines need not exist, except for purely experimental purposes, and the fact that they do exist merely indicates a shortage of machines in the R.F.C.

A Simple Explanation.

One can quite understand an article of this kind being written or inspired by some disappointed official person, either in or out of the Services, because it must be extremely galling to those who have so long opposed reform to find that all the reforms advocated a year ago by these agitators are now being carried out. At the same time it is a pity that a paper of the standing of the "Pall Mall" should be made ridiculous in the eyes of active service aviators just because someone was not turned on to write the article who knew a trifle more about his subject.

As a matter of fact, practically all the reformers have done has been to put into words, either in print or on public platforms or in Parliament, the demands of active service aviators. While flying men may occasionally laugh in a friendly way at the agitators whose exuberance has carried them a trifle beyond their actual "brief," so to speak, the majority of active service pilots have been heartily in sympathy with the intentions of the agitators.

A certain number of Service people, however, disapproved of the agitators because, being officers and gentlemen of the old type—which incidentally is the finest type in the world—they would rather have died owing to inadequate equipment than have had their beloved Service made the subject of popular clamour. But the only actual opposition to the agitators came from people in the Services who are not flying men, and whose opposition was due to the fact that they knew thoroughly well that if reforms were introduced they would lose their comfortable chairs in offices, or at any rate most of their credit, and might even be compelled to go out into the cold world on active service.

THE NEW GERMAN MACHINES.

The Albatros-Spad.

The aircraft which is known to the Allies' aviators as the German Spad is a tiny single-seater Albatros, which shares, however, beyond the name none of the features of former products of that aircraft works. The almost equal-sized wings are nearly 9 metres in span, they are neither V nor arrow-shaped, and have a single set of struts on each side. The body is "whale"-shaped, and an enclosed stationary engine is employed.

The Albatros differs from the Spad in having the general round tail plane of recent Albatros aircraft, the rudder being further in front of the elevator, and as almost none of its features are to be found in older German biplanes, it looks most like the small Ago single-seater biplanes.

The wings are a little V-shaped, but not of arrow shape, both wings being of equal chord, and possessing the same gap in their whole length. There are trailing ailerons, as on the ordinary Albatros, further, one single or two pairs of masts to each side beyond the four vertical legs of the cabane.

The body with tail and landing chassis are as on the Nieuport.

A fixed engine is employed, running in an almost hemispherical cowl, and the propeller is provided with a cap.

The petrol tank is placed behind the engine

The New Fokker.

On Oct. 13th a new single-seater Fokker chaser biplane, piloted by Lt. Otto Essbach, was forced to alight by Allmend, east of Soleure (Switzerland). It differs mainly from the one that was illustrated in The Aeroplane over a year ago, in having upper and lower wings of equal span and chord.

The upper wings are mounted on a narrow cabane of Nieuport type, and almost touch the body in front and are cut out behind. There are two pairs of struts of round tubes, having a streamline case, as in the landing chassis, to both sides.

Lateral stability is not maintained by ailerons, as is the common case with biplanes, but by warping both the upper and lower planes by means of two cables joining the lever at the top of the four back struts and of two others, joining it at their base in passing through the top of the cabane.

The rudder is of the shape of a comma, but, as in the case of the Nieuport, carried somewhat further behind than in the Fokker monoplane. The elevator is of Morane outlines.

The body is a thick hexagonal Morane one, diminishing towards the tail; the form is not altogether that of monocoque, but approaches the "whale" type.

Between two neighbouring ribs the canvas is maintained at the leading edge by three intermediary tacks.

The landing gear is simplified, as in the case of all the other biplanes, being no more of M appearance in front view, as in the Morane, with additional tubes behind, but two narrow forward pointed Vs as by some Moranes.

The engine is a single valve Oberursel motor, the propeller a Garuda, and the same cowl is employed as in the monoplane.

The practise of the Fokker monoplane is followed in arranging the machine-gun for firing through the propeller. The wings and the body of the captured aircraft were painted green and black, with a bright blue cross thereon.

The Halberstadt.

The Aeroplane published recently a view of the Halberstadt biplane from a German source; meanwhile particulars are to hand, for which indebtedness is acknowledged to the French technical journal "L'Aérophile," of the first Halberstadt scout, D.III 206, shot down on October 20th.

The main measures of the machine, being a two-seater, are:—

Length (total), 6.35 metres (about 20 ft.).
Span of planes, 8.70 metres (about 30 ft.).
Chord of planes, 1.55 metres (about 5 ft.).
Stagger, 0.45 metre (1 ft. 6 in.).
Gap between planes, 1.30 metres (about 3 ft. 6 in.).
Motor, 120-h.p. Argus.
Propeller, length, 2.65 metres (about 8 ft. 6 in.).
Propeller, pitch, 1.75 metres (about 5 ft. 3 in.).
Petrol tank capacity, 70 litres.
Oil tank capacity, 6 litres.

The body and rudders are of Morane outlines, the former is carried out in spruce with nailless assemblage.

The upper wings, which are fixed only a little above the body, are equipped with ailerons, and a feed-tank of 17 litres capacity, forms together with the radiator in front a fixed wing machine, being fitted in the upper planes as in the Rumpler biplane.

The armament consists of a Maxim gun, which fires through the propeller as on the Fokker, Albatros and Rumpler.

The Roland.

As the pre-war and early war monoplanes of Germany were generally nomenclatured "Tauben" (doves), owing to their zanonia back-swept shaped planes, the latest German fighting biplanes (like Roland, Halberstadt, and so on) are likely to be named "Walfische" (whales), as their aspect comes to them from the big front part of the body, which houses the 160-h.p. or 220-h.p. motor.

Such a biplane was captured on March 24th, 1916, in bad condition, being a "Roland," which is the name of aircraft manufactured by the Luft Fahrzieug Gesellschaft (L.F.G. by initials), at Adlershof, successors of the old German Wright Aeroplane Co., and thus not to be confused with the L. V. G. Co. at Johannisthal (Luft Verkehrs Gesellschaft, or Air Traffic Co.).

This Roland biplane was a two-seater with the passenger behind, the main dimensions being:—

Span of planes, 9.70 metres (about 32 ft.).
Chord of planes, 1.60 metres (about 4 ft. 6 in.).
Gap of planes, 1.55 metres (about 4 ft. 6 in.).
Engine, 160-h.p. Mercedes.
Propeller, length, 2.70 metres (about 9 ft.).
Propeller, pitch, 1.85 metres (about 5 ft. 6 in.).

Only the upper planes had ailerons, which were worked in the ordinary way. There were two hollow longitudinal spars, the front one 85 mm. by 25 mm., the back one of 100 mm. by 62 mm. measures, having a gap of 60 centimetres, the latter being almost in the middle of the plane.

The upper planes are cut away above the fuselage to add to the view and field of firing. The sides are also perforated with windows. This fuselage was of oval monocoque shape.

The plane mounting is on a single cabane, not a pair, one each side—as on the small D.F.W. of 1914.

The landing chassis is ordinary with a claw-brake.

The armament is a Lewis gun mounted on a tower.

As to performance, the following figures are available:—

Rise to 500 metres (about 1,500 ft.) in 4 minutes; to 1,000 metres (about 3,000 ft.) in 8 minutes; to 1,500 metres (about 4,500 ft.) in 14 minutes; to 2,000 metres (about 6,000 ft.) in 22 minutes.

THE ROYAL AIRCRAFT FACTORY SALE.

The following significant advertisement appeared in the "Morning Post" of Jan. 3rd:—

SOUTH FARNBOROUGH
ROYAL AIRCRAFT FACTORY.
Messrs. Horne and Co.
will SELL, by TENDER, at an early date, a quantity of
OBSOLETE AIRCRAFT FITTINGS
and
PARTS OF AEROPLANES, &c.,

including a great variety of useful parts, suitable for machines of varied character, and particularly for those not in service but still in use commercially and otherwise. Further details will be advertised.—Forms of tender may be had on written application to Messrs. Horne and Co., Auctioneers and Surveyors, 85, Gresham Street, E.C.

The efficiency of the new superintendence of the R.A.F. is somewhat indicated in this notice.

There must be at the R.A.F. vast quantities of material, fittings and engines, which would be of great use to builders of school machines, and even for the construction of experimental aeroplanes, so that the sale ought to be well attended. The fact that these goods are being sold instead of merely being put on the scrap-heap or buried, as seems to have been the custom in earlier days, shows a desire to study the country's interests which is entirely praiseworthy.

BEARDMORE AERO ENGINES

Justly famed for their
RELIABILITY,
POWER and SPEED

THE BEARDMORE AERO ENGINE LTD.
London Showrooms and Depots:
112, GT. PORTLAND STREET, LONDON, W.
Telephone: Gerrard 238.

THE AIR BOARD.

The Hotel Cecil, with the exception of the east wing, which is also the home of the Constitutional Club, has been taken over by the Office of Works on behalf of the reconstituted Air Board. In the meantime nearly 500 guests of the hotel, of whom two-thirds are military officers, have to find fresh quarters—by no means an easy task. Seventy-five Masonic lodges must seek new quarters, and the Director of Military Railways is also to be housed elsewhere.

Lord Cowdray, the President of the Air Board, with a number of his staff, inspected the building on Saturday, and selected the most suitable rooms for their offices.

It is understood that the department of the R.N.A.S. which deals with matériel is to move, or is actually moving, to the new Air Ministry at the Hotel Cecil, whither the "opposite numbers" in the R.F.C. of the various departmental chiefs will also be brought from Adastral House. Any little arguments between the two Services are understood to be in abeyance at present, and apparently a flag of truce has been hoisted while the furniture vans are at work. One can only hope that the armistice may produce a permanent peace, and later a definite alliance. Meantime, there will be little regret if some of the human furniture of both departments is lost in transit, as is the habit of furniture removers in all grades of society.

THE R.N.A.S. COMFORTS FUND.

In the past a number of gramophones have been supplied by the R.N.A.S. Comforts Fund to the different Naval Air Stations and seaplane carriers, and to celebrate Christmas the repertoires of most of these instruments were increased by the presentation of additional records, no less than 500 being sent away in all. The Fund has also sent supplies of cigarettes to all the Air Stations at home and abroad.

The following cash contributions are acknowledged:—Mrs. Groves (two donations), £49 3s.; S. E. Saunders, Esq., £5; Mann, Egerton and Co., Ltd., £5; Miss Jamieson, £2; Mrs. Burke, £1; Master Cyril Sutton, 2s. 6d.

Further contributions in cash or kind should be sent to Mrs. Sueter, The Howe, Watlington, Oxon.

AEROPLANE FABRIC SUPPLIES.

A notice has been issued by the Army Council under the Defence of the Realm Regulations with regard to linen yarns. It is announced that the notice of December 30th has no application to yarns spun from flax tow; and that the exceptions to the Order do not include any yarns suitable for aeroplane linens, dealings in which are absolutely prohibited.

Notice is also given of an intention to take possession of all stocks of Courtrai flax or yarns, and an order has been made requiring all persons holding any stocks of Courtrai flax to make a return with full particulars within four days, which should be addressed to D.A.E.4.S.3., War Office, Adastral House, London, E.C.

A further order has been made providing that flax which might be used for the manufacture of aeroplane cloth must not be used for any other purpose without the permission of the Director of Aircraft Equipment, Adastral House.

All this, apparently, indicates a certain shortage of the particular fine yarns required, according to present theories, for aeroplanes in numbers according with the new programme.

One ventures, therefore, to suggest that a conference between practical aeroplane constructors, practical weavers, and practical dope makers, free from interference by theorists, could readily arrive at a system of wing-covering which would permit the use of other and more easily obtainable grades of flax.

Moreover, it is well within practical politics to consider the abolition of woven thread fabrics altogether, and the substitution of metal gauze filled with suitable dope.

SETTING AN EXAMPLE.

An item of interest is the formation in the Blackburn Aeroplane and Motor Company, Ltd., of a prosperous War Savings Association, in which fully 75 per cent. of the staff and workpeople have already joined. Mr. Stuart A. Hirst has been elected treasurer, and Mr. A. H. Stamp, of the Costing Department, secretary, with a committee representing the different shops and offices. The first week's collection, which occurred immediately after Christmas, realised quite a big bunch of War Savings Certificates.

Major Rigg came down and addressed meetings of the day-shift and night-shift a few days prior to Christmas, and described the meetings as the most enthusiastic he had held in the whole of his northern tour. Mr. Hirst presided at the day meeting, and Mr. Blackburn at the night meeting.

Mr. Hirst, who is chairman of a propaganda committee of this War Savings Association in Leeds, is to be congratulated on the success which has attended his efforts at organisation.

SOME R.F.C. POEMS.

"War Lyrics," by George R. Samways, R.F.C. (Stockwell). has just been published at 1s. net, and may be had from the Wm. Dawson Publishing Co., Ltd., 2, Breams Buildings, E.C.

THE WRECK OF THE OLD F.E.

(*With apologies to the late lamented schooner "Hesperus."*)

It was the F.E. "Tan Yiak Kim,"
That flew the wintry sky;
The pilot had taken a second A/M
To bear him company.

Red were his eyes as the crimson rose,
His nose like the dawn of day;
His feet as cold as the mess-room stove,
As they ploughed their chilly way.

The skipper he sat in the pilot's seat,
His heart was in his mouth,
As he watched how the veering blaw did blow,
The clouds now west, now south.

Then up and spake the observer bold,
With a gesture of his hand,
"I'm hanged if I know where the h—— we are,
So hurry up and land."

"Last week the sky was full of 'planes,
To-day no 'planes we see."
But the captain spat on his aneroid,
And a scornful laugh laughed he.

Higher and higher he climbed his "'bus,"
And looked for his escort bold;
But they were down in the mess-room hut—
(If you wish the truth to be told).

Down came the storm and smote amain
The F.E. in her strength;
She shuddered and stalled, like a frighted steed,
Then dropped a cable's length.

"Lie down, lie down, my little A/M,
And do not tremble so;
For I can weather the roughest gale
That ever wind did blow."

"O Captain! I hear a pop—pop—pop;
O say, what may it be?"
"It's a blasted Hun on my blinking tail";
And he turned around to see.

"O Captain! I see two crosses black:
Oh say, what may it be?"
"Get up on the locker and shoot, you fool.
And don't stand talking to me!"

"O Captain! I don't understand the gun;
O say, what shall I do?"
But the Captain's words were wafted back.
And broke the "prop" in two.

Then down through the fleecy clouds below,
The F.E. drifted fast;
The observer thought of his future,
And the pilot thought of his past.

And ever the fitful gusts between
A sound—what can it be?
'Twas "Archie" paying his last respects
To the wreck of the old F.E.

The Trenches were right beneath her bows.
She drifted a dreary wreck,
And the Captain swore if he *did* get down,
He'd break the blighter's neck.

She struck where the verdant waving grass
Looked soft as a downy bed;
But a couple of cows got in her way,
So she quietly stood on her head

Full twenty yards across the ground
The luckless two were cast.
"I think I'll go," said the second A/M,
"The danger is not past."

At daybreak in a barren field,
He still was running round;
Whilst close behind the pilot came,
For ever gaining ground.

The oil was frozen on his face,
His mouth was full of sand;
But nearer came the avenger grim,
With the Joy-stick in his hand

* * * * *

Such was the Wreck of the old F.E
In the land of rain and mud.
Lord, save us all from such an A/M,
And make the weather "dud."

"Tail-boom."

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ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of THE AEROPLANE. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

W. N. F. (B.E.F.).—It is possible for enlisted men to obtain leave to come from active service to learn to fly at their own expense. The most usual course, however, is for them to apply for permission to come home to undergo a Cadet course before being granted a commission. Your best course would be to ask your commanding officer for permission to apply for a cadetship in the R.F.C. This would probably be easier than obtaining a transfer to the R.N.A.S. I should advise you, however, to spell the word aeroplane correctly, and place the "e" before the "r," as a mistake of this nature in applying for appointment to the R.F.C. might be sufficient to get you turned down. It is just possible that you might obtain a transfer as an N.C.O. observer-gunner.

A. W. C., H.-E. (Crowborough).—It is correct to apply for appointment to a Cadet Battalion, R.F.C., but application for appointment to the R.N.A.S. should refer to "Probationary Flight Officer," and not "Probationary Flight Sub-Lieutenant." Applications in the first instance should be made by letter, and there is no need to give any particulars at all. A request should be made for the necessary forms. You should hear from the War Office or the Admiralty, as the case may be, within a few days of making the application.

H. T. (Selby).—I regret that I cannot give you the particulars required of the Short folding seaplane, as these machines are still used on active service. There were several photographs and sketches published in THE AEROPLANE of one of the earlier types of this machine before the outbreak of war, and I am afraid that until war is over you will have to be content with such particulars as you can glean from these photographs.

A course of tuition at a civilian school would certainly assist your appointment to an R.F.C. Cadet unit. Tuition fees are only returned to candidates obtaining "General List" commissions, not to those obtaining temporary commissions. The Hall School at Hendon takes civilian pupils, as does the Bournemouth School at Talbot Village, Bournemouth.

T. R. H. L. (Hull).—Boy learners should be able to get in to the R.F.C. at 17. Boy learners receive such instruction as will fit them to be efficient air mechanics. They have to sign on for four years, irrespective of the duration of the war. Youths who go to Sandhurst are expected to accept commissions in the Regular Army, but transfer is always possible. Undoubtedly R.F.C. work after the war will be most interesting, for much experimental work will be done, and no doubt will include a great deal of foreign service on garrison duty, etc.

It has already been explained in THE AEROPLANE that it is quite easy to fire a machine-gun through an ordinary aeroplane propeller. Most of the bullets go out between the blades, and it is usual to fix a steel plate to protect the propeller where bullets are likely to strike it. Various more or less successful attempts have also been made to synchronise the action of a machine-gun with the motions of the propeller to make it impossible for the bullets to strike the blades.

Captain Barber's new book, "The Aeroplane Speaks," is the best general exposition of aviation yet published. It can be obtained post free for 6s. from the William Dawson Publishing Co., Rolls House, Breams Buildings, E.C.

H. G. S. (Headingley).—It is not clear from your letter whether your application for a cadetship in the R.F.C. was in person or by letter. There are a variety of reasons for which the authorities may have rejected your application. Not knowing anything about you, it is quite impossible to say which was the one. It is possible that your previous experience does not make it likely that you would become an efficient officer of the R.F.C.

W. H. A. (Huddersfield).—The address of the publishers of "La Guerre Aérienne" is 30, Rue de Provence, Paris, and earlier copies can be obtained from this address. The price is 50 centimes per copy.

Doubtless you can obtain photographs of Garros and Gilbert from one of the French photographic firms, such as Meurisse or Rol, of Paris, or from "La Guerre Aérienne."

As regards the Schneider Cup race of 1914, Mr. Pixton, on a Sopwith, won in 2 hours 13 seconds, his average speed being 86.6 m.p.h. The second man was M. Burri, on an F.B.A., whose complete time was 3 hours 23 minutes. His fastest 50 kilometres was covered at the rate of 65.3 m.p.h. Nobody else completed the course.

It is impossible to give you the dimensions, speed and shape of the latest Morane monoplane, because this is a weapon of war, and it would, therefore, be contrary to the Defence of the Realm Act to give you any information about it.

H. S. H. (Wallington).—The streamers which you have noticed on aeroplane wings and rudders probably have to do with the instruction of the young in the practical knowledge of aerodynamics—such things, for example, as what the machine is doing when turning or diving, or banking or stalling.

S. A. (Coventry).—Applicants for appointment to the A.I.D. should write to the Chief Inspector, Aeronautical Inspection Department, R.F.C., Adastral House, Victoria Embankment, E.C.

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THE ADMISSION OF CIVILIAN PUPILS IS SUSPENDED, THE SCHOOL BEING EXCLUSIVELY ENGAGED UPON MILITARY WORK.

Sixteen years' experience as a practical woodworker should be a pretty fair qualification for woodworking inspection. You do not state your age, but you will probably find it very difficult now to get an A.I.D. appointment if you are of military age and physically fit. Being at present engaged on war work means, presumably, that you are a badged man, but that might not be any bar to an appointment.

Petty Officers, R.N.A.S. (H.M.S. "Hart.")—Many thanks for the artistic card and good wishes for the New Year, which are heartily reciprocated. The self-imposed motto 'Air Mechanics never die, they only fade away," is quite delightful. All the same, one has heard of Air Mechanics dying on duty, just as much as if they were in the trenches, and sundry Air Mechanics have, to the writer's personal knowledge, done exceedingly gallant things, not only in the air, but on land and sea; so good luck to them all in the New Year.

Boy Learners: D. W. S. E. (Pontypool) and A. J. (Peckham) write asking for full particulars concerning the duties of Boy Learners in the R.F.C. These can be obtained from the Directorate of Military Aeronautics, Adastral House, Victoria Embankment, E.C. Boy Learners are taught to become Air Mechanics, but they are not particularly likely to be taught to fly, as the R.F.C., apparently, does not consider that any other than commissioned officers make good pilots. There is, however, always the opportunity for a smart young man, after having passed the Boy Learner stage, to become a commissioned officer from the ranks, and so become a pilot. Otherwise, prospects of advancement are precisely those of any man in any branch of the Service who has brains and ability. Boy Learners receive pay and wear uniforms. Applicants for enlistment as boy ratings R.N.A.S. should apply to the Air Department, the Admiralty, Whitehall, S.W., for information.

A RECORD ISSUE.

This issue of The Aeroplane creates a record for aeronautical journalism.

It contains the greatest amount of reading-matter ever published in an aircraft paper.

It contains the greatest amount of advertising ever published in an aircraft paper.

It has the biggest circulation of any aircraft paper.

It has the biggest net sale of any aircraft paper.

It has the smallest "free list" of any aircraft paper.

These three last statements are also true of The Aeroplane's regular weekly circulation.

AN OLD YEAR ENTERTAINMENT.

On Dec. 30th, at the canteen of her husband's factory at Acton, Mrs. Vandervell gave a dinner and entertainment to a large party of wounded. Mrs. Vandervell's wish was to give as many as possible a thoroughly enjoyable afternoon, with the result that some 400 men came from the Roehampton Hospital.

Dinner was served at 12.30, followed by a variety entertainment that would have been a credit to any of our leading London variety theatres. One half of the canteen, which seats 1,500, was turned into a beautiful miniature theatre, which was packed to the doors. The men were waited on by a staff of voluntary women "munitioners," and had a most enjoyable day.

FOR SUB-CONTRACT ORDERS.

The Osborne Aircraft Components Company, of Whinhill, Greenock, Scotland, announce their desire to negotiate for subcontracts for the manufacture of component parts of aeroplanes. They are equipped to undertake the manufacture of complete planes and tail units, or the parts thereof, and any kind of wood or metal work. Inquiries will receive prompt attention.

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From practical experience we know what will be the form of construction most likely to be licensed by the Ministry of Munitions without undue delay.

HEATING AND LIGHTING.

In giving you an estimate of the cost of your building we can include for heating and lighting.

GUARANTEE.

OUR NORMAL standard of work enables us to guarantee the various sections of the work included in our contracts.

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We guarantee completion under heavy penalties in a reasonable time. There are no "hedging" clauses in our estimates. WE TAKE ALL THE RISKS of delay in delivery of materials, bad weather, etc.

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Not in every case, but generally we can give approximate tenders immediately on the telephone. We have recently been of considerable assistance to one or two firms who have telephoned us from the country, asking us to oblige them with an estimate of the cost of the necessary buildings, heating and lighting, to turn out a given number of aeroplanes a week.

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The R.F.C. Honours List for 1916.

[Below is given a list of honours, awards, and special promotions won by the R.F.C. and officers attached thereto and immediately concerned therewith; and notified during 1916.

Awards dated Dec. 31st, 1915, are included because they appeared after the last annual list of R.F.C. honours was printed. —Ed.]

The Victoria Cross.

August 5th, 1916.

Captain (temp. Major) Lionel Wilmot Brabazon Rees, R.A. and R.F.C.

For conspicuous gallantry and devotion to duty. Whilst on flying duties, Major Rees sighted what he thought to be a bombing party of our own machines returning home. He went up to escort them, but on getting nearer discovered they were a party of enemy machines, about ten in all.

Major Rees was immediately attacked by one of the machines, and after a short encounter it disappeared behind the enemy lines, damaged.

Five others then attacked him at long range, but these he dispersed on coming to close quarters, after seriously damaging two of the machines. Seeing two others going westwards, he gave chase to them, but on coming nearer he was wounded in the thigh, causing him to lose temporary control of his machine. He soon righted it, and immediately closed with the enemy, firing at a close-contact range of only a few yards, until all his ammunition was used up.

He then returned home, landing his machine safely in our lines.

September 5th, 1916.

Lieutenant Wm. Leefe Robinson (Worcester Regt and R.F.C.)

For most conspicuous bravery.

He attacked an enemy airship under circumstances of great difficulty and danger, and sent it crashing to the ground as a flaming wreck.

He had been in the air for more than two hours, and had previously attacked another airship during his flight.

* * *

The Order of the Bath.

January 13th, 1916.

To be Companions.

Lieutenant-Colonel Edward Bailey Ashmore, M.V.O., R.A. and R.F.C. (Jan. 1st, 1916.)

Major Francis Leycester Festing, Northd. Fus. and R.F.C. (Jan. 1st, 1916.)

* * *

The Order of St. Michael and St. George.

June 2nd, 1916.

To the Third Class, or to be Companions.

Major and Brevet Lieutenant-Colonel (temp. Lieutenant-Colonel) E. L. Ellington, R.A.

Major (temp. Lieutenant-Colonel) L. E. O. Charlton, D.S.O., Lancs. Fus. and R.F.C.

* * *

The Distinguished Service Order.

January 13th, 1916.

Major Ralph Longstaff, R.A., attd. R.F.C.

Captain Henry le Marchant Brock, R. Warwickshire Regt. and R.F.C.

Captain John Glanville Hearson, R.E. and R.F.C.

New Year's Honours.

January 23rd, 1916.

Captain Malcolm McBean Bell-Irving, R.F.C. (Special Reserve).

For conspicuous and consistent gallantry and skill during a period of nine months in France, notably on December 19th, 1915, between Lille and Ypres, when he successfully engaged three hostile machines. The first he drove off, the second he sent to the ground in flames, and the third nose-dived and disappeared. He was then attacked by three other hostile machines from above, but he flew off towards Ypres, and chased a machine he saw in that direction. He overhauled it and had got to within a hundred yards when he was wounded by a shell and had to return.

March 30th, 1916.

Second Lieutenant (temp. Lieutenant) Malcolm Henderson, 4th Ross Highland, Seaforth Highrs., T.F. and R.F.C.

For conspicuous gallantry when, on photographic reconnaissance, his machine was struck by a shell from an enemy anti-aircraft gun. The shell passed through the nacelle of the machine, and took off his leg just below the knee. In spite of this he succeeded in coming down from 7,000 ft., and landing 3,000 yards behind our line, thus saving his aeroplane and the life of the observer.

June 2nd, 1916.

Captain and Brevet Major S. D. Massy, R.F.C., Indian Army.

Captain and Brevet Major A. J. Ross, R.E. and R.F.C.

July 27th, 1916.

Captain Stuart Grant-Dalton, York R. and R.F.C.

For conspicuous gallantry and resource. When on return from escort duty his observer, Sec. Lieut. Paris, discovered one of our machines which had been forced to land in enemy country owing to damage by hostile fire. Capt. Grant-Dalton, with great gallantry, landed, destroyed the machine, which was past repair, and returned 90 miles to his aerodrome with his observer and the pilot of the other machine.

[This citation refers to an episode in Egypt.—Ed.]

Second Lieutenant George Reynolds McCubbin, R.F.C., Spec. Res.

For conspicuous gallantry and skill. Seeing one of our machines about to engage two Fokkers, he at once entered the fight, and his observer shot down one Fokker, which crashed to the ground. On another occasion when returning from a bombing raid he saw one of our machines being followed by a Fokker. He recrossed the lines to the attack and his observer shot down the Fokker. Although very badly wounded in the arm, he successfully landed his machine well behind our lines.

[This citation refers to the officer who piloted the machine which brought down Lieut. Immelmann.—Ed.]

August 19th, 1916.

Temp. Second Lieutenant Arthur Lionel Gordon-Kidd, Spec. List and R.F.C.

On one occasion he dived his machine from a height of 7,500 ft. to 900 ft. and placed a bomb on the enemy's ammunition train, which set it on fire and blocked the line. A few days afterwards he performed another very hazardous undertaking well within the enemy's lines, whilst exposed the whole time to all descriptions of heavy fire.

August 25th, 1916.

Second Lieutenant James Hector Ross, R.F.C., Spec. Res.

On two occasions he carried out reconnaissances at a very low altitude to determine the general situation. His machine was repeatedly hit by rifle fire, and he was severely wounded in the arm. His reports were most valuable.

Temp. Lieutenant Allen Higson Smith, Lincoln R. and R.F.C.

For most gallant and skilful work in connection with artillery. In one instance, flying at 1,000 ft. under heavy fire, his information led to the destruction of two enemy batteries. On another occasion he flew under clouds for two hours at 600 ft., sending down information. His machine was repeatedly hit. He has set a fine example.

Lieutenant Robert Howell Craster Usher, Wilts R. and R.F.C.

Attacking three hostile machines and driving them off. On another occasion he fought five hostile machines, and although hit in the leg continued to fight till his engine stopped. He succeeded under great difficulties in reaching an aerodrome, where he collapsed through loss of blood.

September 22nd, 1916.

Temp. Second Lieutenant Henry Cope Evans, Gen. List, attd. R.F.C.

For conspicuous skill on many occasions in attacking hostile aircraft, frequently against large odds. In one fortnight he brought down four enemy machines, returning on one occasion with his machine badly damaged.

Captain John Upton Kelly, Wilts R. and R.F.C.

For conspicuous skill on several occasions. When making a reconnaissance he came down to 700 ft. under heavy fire, and obtained valuable information. Again, in attempting to observe through clouds, he flew over the enemy lines at 500 ft., and although severely wounded and almost blind, he brought his machine back to our lines.

Temp Captain Allister Mackintosh Miller, Cav. and R.F.C.

For conspicuous skill when attacking troops on the ground under heavy fire. On one occasion he flew close to the ground along a line of hostile machine-guns, engaging them with his machine-gun, drawing their fire, and enabling the cavalry to advance. Again, when alone, he engaged five enemy machines, bringing one down, and also successfully bombed a troop train, coming down to 300 ft. to make sure of hitting.

September 13th, 1916.

Second Lieutenant Wulstan Joseph Tempest, Gen. List and R.F.C.

In recognition of conspicuous gallantry and devotion to duty in connection with the destruction of an enemy airship.

September 26th, 1916.

Second Lieutenant (temp. Lieutenant) Albert Ball, M.C., Notts. and Derby R. and R.F.C.

Observing seven enemy machines in formation, he immediately attacked one of them and shot it down at 15 yards range. The remaining machines retired. Immediately afterwards, seeing five more hostile machines, he attacked one at about 10 yards range and shot it down, flames coming out of the fuselage. He then attacked another of the machines, which had been firing at him, and shot it down into a village, when it landed on the top of a house. He then went to the nearest aerodrome for more ammunition, and, returning, attacked three more machines, causing them to dive under

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control. Being then short of petrol, he came home. His own machine was badly shot about in these fights.

October 19th, 1916.

Captain and Brevet Major Hugh Lambert Reilly, Punjabis and R.F.C.

[For services in Mesopotamia.—Ed.]

October 20th, 1916.

Captain William Douglas Stock Sanday, M.C., R.F.C.

For conspicuous gallantry and skill. He has led over 35 patrols with great gallantry. On one occasion a machine of his formation was attacked, but he charged and brought down the enemy machine in flames. He has destroyed at least four enemy machines.

Lieutenant (temp. Captain) Alan Machin Wilkinson, Hamps. R. and R.F.C.

For conspicuous gallantry and skill. He has shown great dash in attacking enemy machines, and, up to the end of August, he had accounted for five. On one occasion while fighting a hostile machine he was attacked from behind, but out-manœuvred the enemy and shot him down. Finally he got back, his machine much damaged by machine-gun fire.

November 14th, 1916.

Second Lieutenant Patrick Anthony Langan-Byrne, R.A. and R.F.C.

He has shown great pluck in attacking hostile machines, often against large odds. He has accounted for several. On one occasion, with two other machines, he attacked 17 enemy machines, shot down one in flames, and forced another to land.

Second Lieutenant Claude Alward Ridley, M.C., R. Fus. and R.F.C.

For judgment in the execution of a special mission. When his machine was wrecked, he showed great resource, and obtained valuable information.

November 23rd, 1916.

Captain (temp. Lieutenant-Colonel) Wilfrid Rhodes Freeman, M.C., Manch. R. and R.F.C.

[With effect from June 3rd. Apparently a belated honour for services in Egypt.—Ed.]

December 11th, 1916.

FOR SERVICES IN EGYPT.

Second Lieutenant Arthur Gerald Knight, M.C., R.F.C.

He led four machines against 18 hostile machines. Choosing a good moment for attack he drove down five of them and dispersed the remainder. He has shown the utmost dash and judgment as a leader of offensive patrols.

December 15th, 1916.

Second Lieutenant Ian Vernon Pyott, R.F.C.

For conspicuous gallantry and devotion to duty in connection with the destruction of an enemy airship.

December 22nd, 1916.

Captain (temp. Major) Philip William Lilian Broke-Smith, R.E. and R.F.C.

Captain Henry Aloysius Petre, M.C., Australian F.C.

[For services in Mesopotamia.]

Dec. 31st, 1916, for Jan. 1st, 1917.

Lt. (temp. Maj.) Edgar James Bannatyne, Hrs. and R.F.C.

Maj. (temp. Lt.-Col.) John Harold Whitworth Becke, Notts and Derby R. and R.F.C.

Maj. Arthur Burdett Burdett, York and Lanc. R. and R.F.C.

Capt. (temp. Maj.) Thomas Algar Elliott Cairnes, D. Gds. and R.F.C.

Capt. (temp. Maj.) John Adrian Chamier, Ind. Army and R.F.C.

Temp. Maj. Frederick Holden Cleaver, Spec. List and R.F.C.

Maj. (temp. Lt.-Col.) George William Patrick Dawes, R. Berk. R. and R.F.C.

Capt. (temp. Lt.-Col.) Ralph Charles Donaldson-Hudson, T.F. Res. and R.F.C.

Capt (temp. Lt.-Col.) Alfred Huggins, R.F.C., Spec. Res.

Capt. (temp. Maj.) George Bayard Hynes, R.A. and R.F.C.

Capt. (temp. Lt.-Col.) Philip Bennet Joubert de la Ferté, R.A. and R.F.C.

Capt. (temp. Maj.) William Foster MacNeece, R.W. Kent R. and R.F.C.

Capt (temp. Lt.-Col.) Cyril Francis de Sales Murphy, M.C., R. Berks. R. and R.F.C.

Maj. Sidney Smith, R.F.A. and R.F.C.

[For general good service during the year.]

* * *

A Bar to the Distinguished Service Order.

September 26th, 1916.

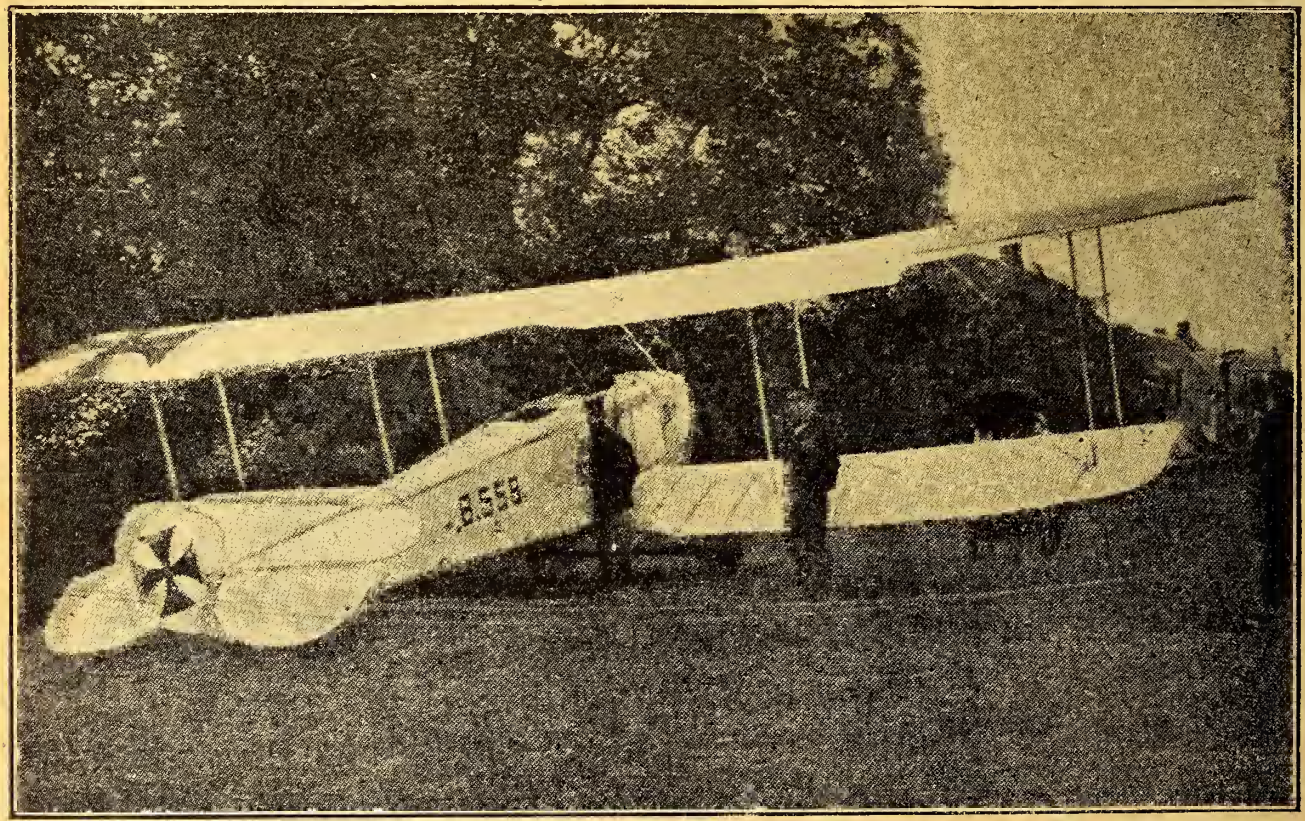
Lieutenant Albert Ball, D.S.O., Notts. and Derby R. and R.F.C.

When on escort duty to a bombing raid he saw four enemy machines in formation. He dived on to them and broke up their formation, and then shot down the nearest one, which fell on its nose. He came down to about 500 ft. to make certain it was wrecked. On another occasion, observing 12 enemy machines in formation, he dived in among them, and fired a drum into the nearest machine, which went down out of control. Several more hostile machines then approached, and he fired three more drums at them, driving down another out of control. He then returned, crossing the lines at a low altitude, with his machine very much damaged. (The award of the Distinguished Service Order is also announced in the "Gazette" of this date.)

November 25th, 1916.

Captain Stuart Grant-Dalton, D.S.O., York R.

He attacked two hostile aeroplanes, although quite unsupported. Later, after being attacked by another enemy



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Aviatik, type P. (1915-1916 type), showing rudder and fin arrangement.

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machine and wounded in three places, he brought his machine back and landed safely.

(The D.S.O. was awarded in "Gazette" dated July 27th, 1916.)

* * *

A Second Bar to the Distinguished Service Order.

November 25th, 1916.

Second Lieutenant (temp. Captain) Albert Ball, D.S.O., M.C., Notts. and Derby R.

He attacked three hostile machines and brought one down, displaying great courage and skill. He has brought down eight hostile machines in a short period, and has forced many others to land.

* * *

The Military Cross.

January 13th, 1916.

Capt. Harold Blackburn, R.F.C. (S.R.).
Capt. James Lee Jackson, Conn. Rangers (S.R.) and R.F.C.
Capt. (temp. Major) E. R. Ludlow-Hewitt, R.I.R. and R.F.C.
Lieut. (temp. Capt.) W. C. K. Birch, Yorks. R. and R.F.C.
Lieut. William Sholto Douglas, R.A. (S.R.) and R.F.C.
Lieut. (temp. Capt.) J. L. Kinnear, Liverpool and R.F.C.
Temp. Lieut. A. H. Parker, Punjab Vol. Rifles and R.F.C.
Lieut. (temp. Capt.) P. H. Lyon Playfair, R.A. and R.F.C.
Temp. Lieut. Frederick James Powell, R.F.C.
Lieut. (temp. Capt.) W. R. Read, 1st Dragoon Gds. and R.F.C.
Lieut. (temp. Capt.) Charles Edmund Ryan, R.A. and R.F.C.
Lieut. (temp. Capt.) Charles Edmund, R.A. and R.F.C.
Temp. Lieut. Herbert Martin Sison, A.S.C. and R.F.C.
Lieut. Alastair Somervail, K.O.S.B. (T.F.) and R.F.C.
Sec. Lieut. (temp. Lieut.) W. H. Dyke Acland, R. Devon Yeo. (T.F.) and R.F.C.
Sec. Lieut. (temp. Lieut.) R. A. Saunders, R.A. (T.F.) and R.F.C.
Temp. Sec. Lieut. (temp. Capt.) E. D. Horsfall, Rifle Brig. (Ser. Batt.) and R.F.C.
Sec. Lieut. (temp. Capt.) E. H. Mitchell, R.A. and R.F.C.
Sec. Lieut. John Whitaker Woodhouse, R.F.C. (S.R.)

January 23rd, 1916.

Lieut. (temp. Capt.) G. L. P. Henderson, R.F.C. (S.R.).
Sec. Lieut. (temp. Capt.) W. D. S. Sanday, R.F.C. (S.R.).

March 22nd, 1916.

Lieut. (temp. Capt.) E. O. Grenfell, R.A. and R.F.C.

March 28th, 1916.

Lieut. C. R. Rowden, Worcs. Regt. and R.F.C.

March 30th, 1916.

Capt. John Edward Tennant, Scots Guards and R.F.C.
Lieut. (temp. Capt.) E. L. Gossage, R.F.A. and R.F.C.
Lieut. (temp. Major) R. P. Mills, R. Fusiliers and R.F.C.
Sec. Lieut. Charles David Danby, R.E. (T.F.) and R.F.C.
Temp. Sec. Lieut. T. S. Howe, 6th Conn. Rangers and R.F.C.
Sec. Lieut. F. N. Hudson, Buffs (E. Kent R.) and R.F.C.
Sec. Lieut. Edward Wilmer Leggatt, Wilts R. and R.F.C.
Sec. Lieut. H. I. F. Yates, No. 14 Squadron, 5th Wing, R.F.C. (S.R.)

April 14th, 1916.

Capt. E. M. Murray, Queen Victoria's Own Corps of Guides, Indian Army (attd. R.F.C.).

May 16th, 1916.

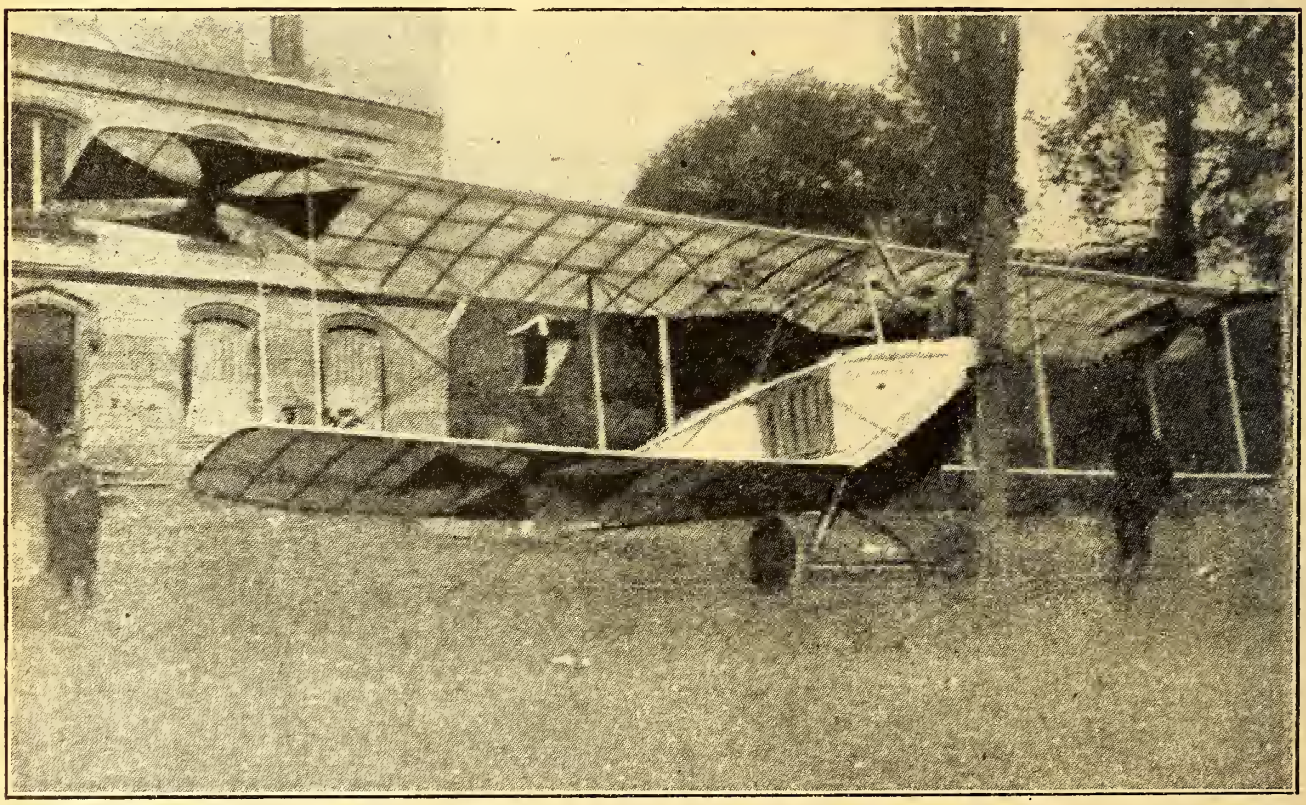
Sec. Lieut. Alfred de Bath Brandon, R.F.C. (Spec. Res.).
Sec. Lieut. (temp. Capt.) H. V. Champion de Crespigny, Suff. R. and R.F.C.
Sec. Lieut. William John Charles Kennedy-Cochran-Patrick, Rif. Brig. and R.F.C.
Sec. Lieut. Claude Alward Ridley, R. Fus. and R.F.C.

May 31st, 1916.

Capt. J. B. Talbot-Leighton, S. Gds. (attd. R.F.C.).
Temp. Lieut. F. Bellamy, Gen. List (attd. R.F.C.)
Temp. Lieut. J. G. Howell, R.F.A. (attd. R.F.C.)
Lieut. F. F. Minchin, Princess Patricia's Can. L.I. (attd R.F.C.)
Lieut. (temp. Capt.) Arthur Ashford Benjamin Thomson, R. War. R. and R.F.C.
Sec. Lieut. Sydney Edward Gowan, R.F.C. (Spec. Res.).
Sec. Lieut. F. D. Stuart Gray, Lord Doune, Scottish Horse, T.F., and R.F.C.
Sec. Lieut. V. A. Stookes, 2nd Dns. (Spec. Res.), attd. R.F.C.
Sec. Lieut. D. Mary Tidmarsh, R. Ir. R. (Spec. Res.) and R.F.C.
Temp Sec. Lieut. R. Verschoyle Walker, Conn. Rangers and R.F.C.

June 2nd, 1916.

Capt. G. W. D. Allen, L'pool R., Spec. Res., and R.F.C.
Sec. Lieut. (temp. Capt.) P. Babington, Hamp. R., T.F., and R.F.C.
Capt. (temp. Major) A. C. Bolton, R. Sc. Fus. and R.F.C.
Capt. M. G. Christie, R.F.C. (Spec. Res.)
Lieut. (temp. Capt.) J. P. C. Cooper, R.F.C. (Spec. Res.)
Sec. Lieut. F. E. Goodrich, R.F.C. (Spec. Res.)
Sec. Lieut. (temp. Capt.) J. H. Herring, R.F.C. (Spec. Res.)
Lieut. (temp. Capt.) B. C. McEwen, R.F.C. (Spec. Res.)
Capt. (temp. Major) T. O'B. Hubbard, R.F.C. (Spec. Res.)
Capt. L. Jenkins, R.G.A., T.F., and R.F.C.
Lieut. (temp. Capt.) L. W. Learmount, R.F.C.(Spec. Res.)
Capt. A. G. Moore, Spec. Res., Manch. R., attd. R.F.C.
Lieut. (temp. Capt.) L. A. Pattinson, R. Fus. and R.F.C.
Capt. (temp. Major) T. V. Smith, R.F.C. (Spec. Res.)
Capt. (temp. Lieut.-Col.) C. F. De S. Murphy, R. Berks. R. and R.F.C.
Sec. Lieut. W. V. Strugnell, Hamps. R. and R.F.C.
Lieut. (temp. Capt.) H. A. Van Ryneveld, R.F.C.



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Aviatik biplane, type P., 1915-1916 type, with pointed nose. Front view.

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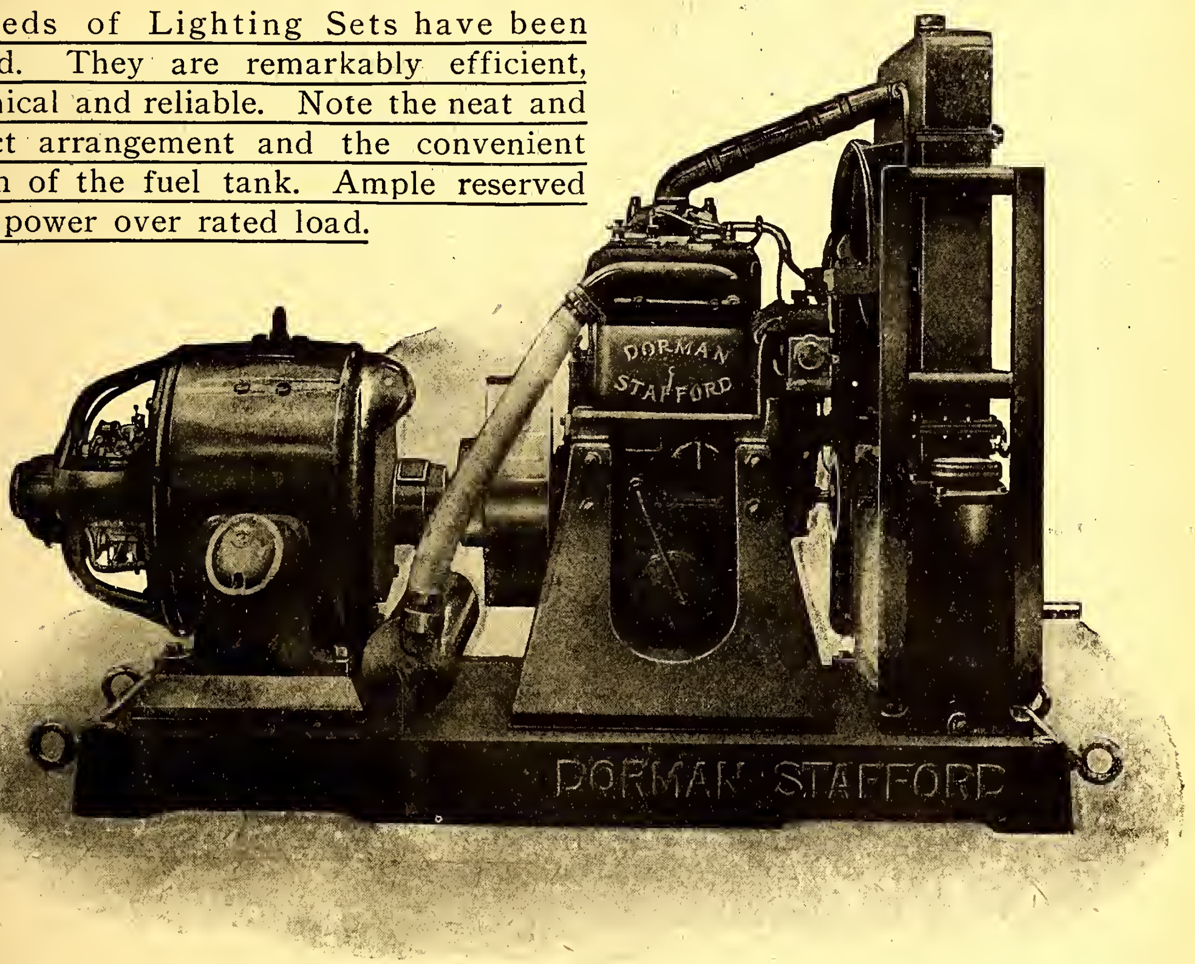

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Capt. Lord G. Wellesley, G. Gds. and R.F.C.

Sec. Lieut. (temp. Capt.) W. G. B. Williams, R.F.C. (Spec. Res.)

June 22nd, 1916.

Temp. Capt. William Milne, Gen. List, attd. R.F.C.

Lieut. (temp. Capt.) A. W. H. James, 3rd Hrs. and R.F.C.

Temp. Lieut. D. Wilson, Gen. List, attd. R.F.C.

Sec. Lieut. (temp. Capt.) Ellert Webster Forbes, 6th R. War. R., T.F., attd. R.F.C.

Sec. Lieut. (temp. Lieut.) J. A. Mann, 5th Sco. Rif., T.F., attd. R.F.C.

Sec. Lieut. (temp. Lieut.) George Ranald Macfarlane Reid, 4th Arg. and Suth'd Highrs. and R.F.C.

Sec. Lieut. D. A. L. Davidson, R.F.C. (Spec. Res.)

Sec. Lieut. (temp. Capt.) Hugh Tomlinson, R.F.C. (Spec. Res.)

June 26th, 1916.

Sec. Lieut. W. D. Maitland Bell, R.F.C. (Spec. Res.)

December 11th, 1916.

Sec. Lieut. (temp. Lieut.) D. D. G. Hall, York R. and R.F.C.

Sec. Lieut. (temp. Capt.) Harold Jameson, R.F.C.

Temp. Lieut. R. Johnston, Gen. List, and R.F.C.

Lieut. Reginald John Lowcock, Notts and Derby R. and R.F.C.

Capt. Charles Mackay, Leins. R. (Spec. Res.), and R.F.C.

July 27th, 1916.

Capt. Ralph Newton Adams, R. Fus. (Spec. Res.), and R.F.C.

Capt. Malcolm McBean Bell-Irving, D.S.O., R.F.C. (Spec. Res.)

Lieut. (temp. Capt.) R. Balcombe-Brown, R.F.A. Spec. Res.) and R.F.C.

Lieut. James Stanley Scott, Can. Local Forces and R.F.C.

Lieut. (temp. Capt.) W. Assheton Summers, 18th Hrs. and R.F.C.

Temp. Lieut. W. O. Tudor Tudor-Hart, North'd Fus. and R.F.C.

Sec. Lieut. Albert Ball, 7th Bn. Notts and Derby R., T.F., and R.F.C.

Sec. Lieut. Dirk Cloete, R.F.C. (Spec. Res.)

Sec. Lieut. (temp. Capt.) Joseph Alan Crook, R.F.C. (Spec. Res.)

Sec. Lieut. Donald Alastair Leslie Davidson, R.F.C. (Spec. Res.)

Sec. Lieut. A. G. D. Gavin, R. Highrs. (Spec. Res.) and R.F.C.

Sec. Lieut. (temp Capt.) W. A. Grattan-Bellew, Conn. Rangers and R.F.C.

Sec. Lieut. Patrick Huskinson, Notts and Derby R. and R.F.C.

Sec. Lieut. James Douglas Latta, R.F.C. (Spec. Res.)

Sec. Lieut. Henry Maurice Talbot Lehmann, Essex R. and R.F.C.

Sec. Lieut. A. S. C. Maclaren, K.O.S.B. (Spec. Res.) and R.F.C.

Sec. Lieut. C. W. P. May, R. Ir. Rif. (Spec. Res.) and R.F.C.

Sec. Lieut. B. J. Warwick Montressor Moore, R.F.C. (Spec. Res.)

Sec. Lieut. Whitworth Archibald Cecil Morgan, 2nd Bn., Welsh R. and R.F.C.

Temp. Sec. Lieut. Darell Kilburn Paris, R.A., attd. R.F.C.

Sec. Lieut. (temp. Capt.) Hugh Tomlinson, R.F.C. (Spec. Res.)

Sec. Lieut. L. Gottfried Harcourt Vernon, R.W. Fus., attd. R.F.C.

August 19th, 1916.

Lieut. Owen Tudor Boyd, Indian Army and R.F.C.

Lieut. Robert Gordon Gould, R.F.C. (Spec. Res.)

Sec. Lieut. Henry Arthur Taylor, R.W. Kent R. and R.F.C.

September 22nd, 1916.

Sec. Lieut. Malcolm Glassford Begg, Rifle Brig. and R.F.C.

Lieut. C. M. Bouverie Chapman, E. Kent R. and R.F.C.

Lieut. W. Eardley Harper, Dur. L.I. (Spec. Res.) and R.F.C.

Temp. Capt. Jacob Guy Swart, R.A. and R.F.C.

Capt. H. E. Fowler Wyncoll, Notts and Derby R. and R.F.C.

Capt. Leoline Jenkins, R.G.A. and R.F.C.

September 26th, 1916.

Sec. Lieut. Norman Brearley, L'pool R. (Spec. Res.) and R.F.C.

Temp. Capt. Gerald Dixon-Spain, R. Fus. and R.F.C.

Sec. Lieut. Guy Patrick Spence Reid, Sea. Highrs. and R.F.C.

Lieut. Ernest Dorland Hicks, Can. Force and R.F.C.

October 20th, 1916.

Lieut. (temp. Capt.) L. P. Aizlewood, York and Lanc. R. and R.F.C.

Sec. Lieut. (temp. Capt.) J. O. Andrews, R. Scots and R.F.C.

Sec. Lieut. (temp. Lieut.) Alan Duncan Bell-Irving, Gord. Highrs. (Spec. Res.), and R.F.C.

Temp. Sec. Lieut. (temp. Capt.) K. R. Binning, Gen. List and R.F.C.

Sec. Lieut. Alan John Bott, R.G.A. (Spec. Res.), attd. R.F.C.

Sec. Lieut. W. H. Carlyle Buntine, Notts and Derby R. and R.F.C.

Sec. Lieut. Clifford Westly Busk, Suff. R. and R.F.C.

Sec. Lieut. (temp. Capt.) J. L. Chalmers, R.F.C. (Spec. Res.)

Temp Sec. Lieut. L. F. Forbes, Gen. List and R.F.C.

Sec. Lieut. Euan J. L. Warren Gilchrist, Lrs. and R.F.C.

October 20th, 1916.

Sec. Lieut. (temp. Capt.) I. H. D. Henderson, Arg. and Suth'd Highrs. and R.F.C.

Sec. Lieut. Geoffrey Terence Roland Hill, R.F.C. (Spec. Res.).

Capt. Henry John Francis Hunter, Rifle Brig. and R.F.C.

Sec. Lieut. (temp. Capt.) C. C. Miles, R.F.C. (Spec. Res.).

Temp. Capt. Kenneth Noble Pearson, Gen. List and R.F.C.

Sec. Lieut. F. E. S. Phillips, Devon R. (Spec. Res.) and R.F.C.

Temp. Lieut. John Reginald Philpott, Gen. List and R.F.C.

Temp. Lieut. David Harden Scott, Army Cyc. C. and R.F.C.

Sec. Lieut. B. V Seymour Smith, R. War. R. and R.F.C.

Sec. Lieut. Herbert Henry Turk, R.F.C. (Spec. Res.).

Temp. Capt. Eric James Tyson, Gen. List and R.F.C.

SOUTH AFRICAN CONTINGENT.

Temp. Capt. (Flt. Comdr.) Kenneth Reid van der Spuy, R.F.C.

November 14th, 1916.

Capt. C. H. Boulby Blount, R.W. Surr. R. and R.F.C.

Sec. Lieut. Arthur Vivian Burbury, York. R. and R.F.C.

Sec. Lt. Patrick Colin Campbell, Arg. and Suth'd Highrs. (Spec. Res.) and R.F.C.

Temp. Capt. Reginald Chadwick, R.F.C.

Lieut. Sydney Herbert Clarke, Wilts R. (Spec. Res.) and R.F.C.

Sec. Lieut. Ivan Curlewis, R.F.C.

Temp. Lt. W. G. Sellar Curphey, Gen. List and R.F.C.

Sec. Lieut. Chester Stairs Duffus, R.F.C. (Spec. Res.).

Temp. Lieut. (temp. Capt.) E. L. Foot, Gen. List and R.F.C.

Lieut. Robert Parsons Harvey, 5th Lrs. and R.F.C.

Temp. Sec. Lieut. R Maxwell Hill, North'd Fus. and R.F.C.

Sec. Lieut. Charles Stanley Hollinghurst, R.F.C. (Spec. Res.).

Sec. Lieut. R. J. Hudson, R. Fus. (Spec. Res.) and R.F.C.

Sec. Lieut. Ralph Hensworth Jarvis, R.F.C. (Spec. Res.).

Sec. Lieut. Leonard Cameron Kidd, R.F.C. (Spec. Res.).

Sec. Lieut. Arthur Gerald Knight, R.F.C. (Spec. Res.).

Lieut. Thomas Eaton Lander, High. L.I. and R.F.C.

Sec. Lieut. Cecil Arthur Lewis, R.F.C. (Spec. Res.).

Temp. Sec. Lieut. Frederick Libby, Gen. List and R.F.C.

Temp. Sec. Lieut. Francis Steele Moller, Gen. List and R.F.C.

Sec. Lieut. (temp. Capt.) R. H. G. Neville, D.C.L.I. and R.F.C.

Temp. Lieut. Sydney Esmond O'Hanlon, Gen. List and R.F.C.

Sec. Lieut. Thomas Sydney Pearson, R.A. and R.F.C.

Sec. Lieut. George Philippi, Dns. (Spec. Res.) and R.F.C.

Sec. Lieut. (temp. Lt.) G. W. Roberts, R.F. (Spec. Res.) and R.F.C.

Sec. Lieut. Hugh Anselm Boulton Robb, R.F.C. (Spec. Res.).

Sec. Lieut. Arthur John Graham Styran, R.A. and R.F.C.

Lieut. (temp. Capt.) J. H. S. Tyssen, N. Som. Yeo. and R.F.C.

Capt. Adolph Andre Walser, Lond. R. and R.F.C.

Temp. Sec. Lt. John Scott Williams, Gen. List and R.F.C.

Temp. Sec. Lieut. G. H. Wood, Gen. List, attd. R.F.C.

Sec. Lieut. C. H. Chapman Woollven, Devon R. and R.F.C.

Sec. Lieut. (temp. Capt.) C. S. Workman, Sco. Rif. and R.F.C.

November 25th, 1916.

Lieut. (temp. Capt.) Frederick Howard Jenkins, R.F.C.

Sec. Lieut. (temp. Capt.) Thomas Maxwell-Scott, R.F.C.

Sec. Lieut. (temp. Capt.) Stephen William Price, R.F.C.

Temp. Sec. Lieut. Theodore James West, R.F.C.

December 22nd, 1916.

Lieut. (temp. Capt.) John Ronald McCrindle, Gordon Highrs. and R.F.C.

[For services in Mesopotamia.]

December 31st, 1916, for January 1st, 1917.

Capt. (temp. Major) Robert Graeme Cherry, R.F.A. and R.F.C.

Temp. Lieut. (temp. Capt.) Cyril Danby, Gen. List and R.F.C.

Temp. Major Thomas Edward St. Clare Danniell, Gen. List and R.F.C.

Temp. Capt. John Ogilvie Davis, R.F.C.

Qrmr. Hon. Lieut. and temp. Major Albert Fletcher, R.F.C.

Temp. Capt. Alastair Cosmo Burton Geddes, Gen. List and R.F.C.

Capt. Napier John Gill, R.A. and R.F.C.

Temp. Sec. Lieut. (temp. Lieut.) Gilbert Ware M. Green, R.F.C.

Capt. Richard Raymond de Cruce Grubb, Hrs. and R.F.C.

Sec. Lieut. (temp. Capt.) Cuthbert Ambrose Anthony Hiatt, Norf. R. and R.F.C.

Lieut. (temp. Capt.) Frank Hudson, R.F.C., Spec. Res.

1717 Sergt.-Major Charles Henry Kernot, R.F.C.

Capt. Hubert Le Jeune, R.F.C., Spec. Res.

Capt. (temp. Major) Rutter Barry Martyn, Wilts R. and R.F.C.

Temp. Lieut. (temp. Capt.) Reginald Stewart Maxwell, Gen. List and R.F.C.

Qrmr. and Hon. Lieut. (temp. Major) John Mead, R.F.C.

Capt. (temp. Major) William Gore Sutherland Mitchell, High. L.I. and R.F.C.

Capt. Allen Handfield Morton, R.F.A. and R.F.C.

Lieut. (temp. Major) Herbert Anselm Oxenham, Spec. Res., R.F.C.

Lieut. Ernest William John Payne, Spec. Res., R.F.C.

Sec. Lieut Charles Robinson Robbins, R.A. and R.F.C.

Temp. Lieut. (temp. Capt.) Percy Gilbert Ross-Hume, Gen. List and R.F.C.

Lieut. John Cotesworth Slessor, R.F.C., Spec. Res.

Sec. Lieut. (temp. Capt.) Bestine E. Sutton, Yeo. and R.F.C.

Qrmr. and Hon. Lieut. William Thomas, R.F.C.

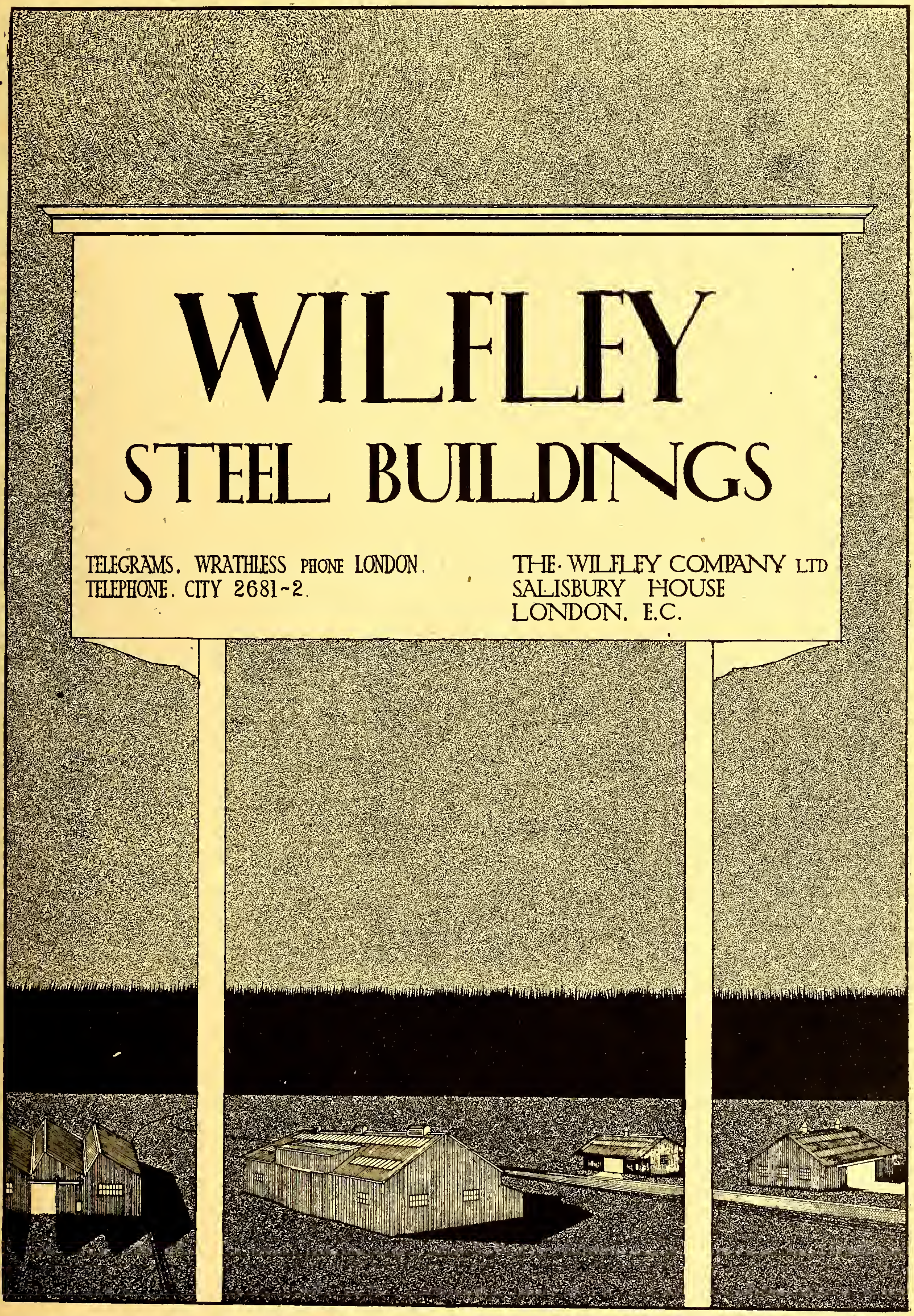
Sec. Lieut. (temp. Capt.) J. T. Whitaker, A.S.C. and R.F.C.

* * *

A Bar to the Military Cross.

September 9th, 1916.

Lieut. (temp. Major) A. A. B. Thomson, R. War. R. and R.F.C.



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October 20th, 1916.
Sec. Lieut. Sidney Edward Cowan, M.C., R.F.C. (Spec. Res.)
Capt. A. G. Moore, M.C., Manch. R. (Spec. Res.), and R.F.C.
November 14th, 1916.
Sec. Lieut. (temp. Lieut.) Malcolm Glassford Begg, M.C., Rifle Bgde (Spec. Res.) and R.F.C.
November 25th, 1916.
Sec. Lieut. Archibald Stuart Charles MacLaren, M.C., K.O.
Lieut. (temp. Capt.) Frederick Frank Minchin, M.C., P.P.C.L.I.
Sec. Lieut. (temp. Capt.) Awdry Morris Vaucour, M.C., R.F.A.
December 11th, 1916.
Sec. Lieut. (temp. Capt.) J. O. Andrews, M.C., R. Scots and R.F.C.

* * *

A Second Bar to the Military Cross.

November 14th, 1916.
Sec. Lieut. (temp. Capt.) S. E. Cowan, M.C., R.F.C. (Spec. Res.)

* * *

The Distinguished Conduct Medal.

January 13th, 1916.
2085 First Class Air Mechanic F. Hartley, R.F.C.
1689 Corpl. E. P. Roberts, R.F.C.
235 Sergt. A. Scott, R.F.C.
January 23rd, 1916.
3022 First Class A.M. T. H. Donald, R.F.C.
January 13th, 1916.
3038 Sergt. F. V. Wright, R.F.C
March 11th, 1916.
Corporal E. P. Roberts, R.F.C.
First Class Air Mechanic F. Hartley, R.F.C.
March 22nd, 1916.
2341 Corpl. C. H. Nott, R.F.C.
March 30th, 1916.
2550 Second Class Air Mechanic A. Dalziel, R.F.C.
4534 Corpl. (Act. Sergt.) W. W. Gregg, R.F.C.
10464 First Class A.M. (Act. Corpl.) H. P. Lowe, R.F.C.
May 30th, 1916.
211 Flt. Sgt. (Actg. S.-M.) C. A. C. Fidler, Aircraft Pk., R.F.C.
212 Flt. Sgt. (Actg. S.-M.) R. J. Sladden, R.F.C.
22 Flt. Sgt. (Actg. S.-M.) W. G. Stafford, R.F.C.
June 2nd, 1916.
1675 Flt. Sgt. H. G. Dadley, R.F.C.
1776 Flt. Sgt. (Actg. S.-M.) H. McKenna, R.F.C.
299 Flt. Sgt. (Actg. S.-M.) T. Bell, R.F.C.
1857 Sgt. S. Bull, R.F.C.
116 Flt. Sgt. (Actg. S.-M.) H. C. S. Bullock, R.F.C.
7911 Second Class Mechanic H. N. Farmer, R.F.C.
7500 Second Class Air Mechanic A. J. Greatorex, R.F.C.
320 Flt. Sgt. (Actg. S.-M.) H. James, R.F.C.
54 Flt. Sgt. (Actg. S.-M.) J. C. Jones, R.F.C.
346 Flt. Sgt. (Actg. S.-M.) M. Keegan, R.F.C.
422 Flt. Sgt. (Actg. S.-M.) C. Littlejohn, R.F.C.
276 Flt. Sgt. M. Weare, R.F.C.
July 27th, 1916.
605 Sgt.-Maj. G. Felstead, No. 14 Sqdn., R.F.C.
136 Flt. Sgt. H. Green, No. 21 Reserve Sqdn., R.F.C.
718 Flt. Sgt. F. J. Hellyer, No. 17 Sqdn., R.F.C.
2988Flt. Sgt. E. Meynell, Hdqrs., 5th Wing, R.F.C.
2707 Cpl. L. Van Schaick, Recruits' Depot, R.F.C.
5800 Cpl. J. H. Waller, No. 25 Sqdn., R.F.C.
198 Sgt.-Maj. F. Whilton, No. 17 Sqdn., R.F.C.
December 11th, 1916.
3464 Sgt. B. Ankers, R.F.C.
December 31st, 1916, for January 1st, 1917.
333 A.S.-M. R. A. Baughan, R.F.C.
1336 Sgt. D. R. Baxter, R.F.C
241 A.-S.-M. L. E. Carter, R.F.C.
891 A.S.-M. F. Eldridge, R.F.C.
723 F.-Sgt. H. A. Gamon, R.F.C.
54 A.S.-M. J. C. Jones, R.F.C.
1739 A.S.-M. C. Marley, R F.C.

* * *

The Military Medal.

August 10th, 1916.
7959 Cpl. F. J. Jenkins, R.F.C.
6326 First Class Air Mechanic J. I. T. Jones, R.F.C.
8483 Second Class Air Mechanic F. A. V. Pattenden, R.F.C.
October 27th, 1916.
2202 Cpl. S. Attwater, R.F.C.
2016 Cpl. J. E. Beddows, R.F.C.
807 Flt. Sgt. W. G. Borrett, R.F.C.
1863 Sgt. C. Brown, R.F.C.
1305 First Class Air Mechanic J. S. Clark, R.F.C.
2126 Sgt. A. R. Edwards, R.F.C.
Air Mechanic E. C. Gill, R.F.C.
45311 Second Class Air Mechanic J. J. Hollyhead, R.F.C.
25076 Second Class Air Mechanic (Actg. Cpl.) F. H. Marshall, R F C.
1049 Cpl. W. N. Mayger, R.F.C.
2437 Sgt. I. Monks, R.F.C.
330 Second Class Air Mechanic T. Murray, R.F.C.
882 Second Class Air Mechanic H. S. Porter, R.F.C.
2594 Sgt. A. H. Read, R.F.C.
92 Flt. Sgt. F. J. Smith, R.F.C.
2551 First Class Air Mechanic F. Thomasson, R.F.C.
364 Flt. Sgt. (Actg. W.O.) G. Thornton, R.F.C.
December 9th, 1916.
839 Sgt. D. W. Beard, R.F.C.
17518 Actg. Cpl. F. Froom, R.F.C.
10720 Second Class Air Mechanic B. Harrison, R.F.C.
1972 Second Class Air Mechanic D. P. Hepburn, R.F.C.
892 Flt. Sgt. J. B. McCudden, R.F.C.
19101 First Class Air Mechanic L. C. Roberts, R.F.C.
SR.7 Cpl. C. Wills, R.F.C.
December 14th, 1916.
G.26969 Second Class Air Mechanic T. Robinson, R.F.C., late R. Innis. Fus.
December 21st, 1916.
7258 Cpl. (Actg. Sgt.) H. Brown, R.F.C.
7748 First Class Air Mechanic W. H. Dowling, R.F.C.
10591 Cpl. C. T. Galpin, R.F.C.
4917 First Class Air Mechanic F. S. Mackrell, R.F.C.
8847 Second Class Air Mechanic J. C. Middleton, R.F.C.
8192 Second Class Air Mechanic A. E. Pitcher, R.F.C.
6773 First Class Air Mechanic A. V. Scholes, R.F.C.
7754 Second Class Air Mechanic H. T. Tabor, R.F.C.
8267 Second Class Air Mechanic S. H. G. Triggs, R.F.C.
7255 Second Class Air Mechanic L. G. Venn, R.F.C.
8237 Second Class Air Mechanic G. L. G. Watson, R.F.C.
8191 Second Class Air Mechanic L. Williams, R.F.C.

* * *

The Meritorious Service Medal.

November 11th, 1916.
4310 Cpl. G. D. Bell, R.F.C.
348 Flt. Sgt. H. E. Bethell, R.F.C.
605 Sgt.-Maj. G. Felstead, R.F.C.
1112 Actg. Sgt.-Maj. J. Fulton, R.F.C.
178 Flt. Sgt. (Actg. Sgt.-Maj.) J. R. Gardiner, R.F.C.
498 Flt. Sgt. S. R. Goldthorpe, R.F.C.
1711 Cpl. G. Green, R.F.C.
136 Flt. Sgt. H. Green, R.F.C.
1025 Flt. Sgt. A. Hawley, R.F.C.
718 Flt. Sgt. F. J. Hellyer, R.F.C.
780 Sgt. G. W. Heppel, R.F.C.
2057 Sgt H. E. Hunt, R.F.C.
607 Cpl. T. Hyland, R.F.C.
4999 Actg. Sgt.-Maj. A. Knight, R.F.C.
3599 Actg. Sgt.-Maj. W. G. Mantell, R.F.C.
2988 Actg. Sgt.-Maj. E. Meynell, Hdqrs., R.F.C.
8347 Actg. Sgt.-Maj. Millington, R.F.C.
217 Flt. Sgt. D. H. Newton, R.F.C.
1027 Actg. Sgt.-Maj. C. Rapley, R.F.C.
5853 First Class Air Mechanic S. Shearing, R.F.C.
4865 Cpl. V. E. Wansbury, R.F.C.
2862 Cpl. R. S. Weaver, R.F.C,
198 Sgt.-Maj. E. Wilton, R.F.C.
1071 Flt. Sgt. E. R. Wood, R.F.C.
December 31st, 1916, for January 1st, 1917.
5011 Sgt. G. H. Bicknell, R.F.C.
6217 Cpl. F. A. W. Braine, R.F.C.
2570 Sgt. J. C. Cooper, R.F.C.
6629 Cpl. (Actg. Sgt.) W. R. Dandy, R.F.C.
3810 F.-Sgt. C. W. Durman, R.F.C.
80 Sgt. (A.-S.-M.) E. Fowles, R.F.C.
255 Sgt. (A.-S.-M.) W. C. Hayward, R.F.C.
3724 Sgt. H. A. Hemming, R.F.C.
3802 Flt. Sgt. H. I. Hooper, R.F.C.
3682 Ist Air Mech. T. Horton, R.F.C.
1416 Flt Sgt. C. J. Howard, R.F.C.
209 A.-S.-M. L. H. Metz, R.F.C.
4 A.-S.-M. C. Mullen, R.F.C.
7134 1st C. Air Mech. O. S. Singleton, R.F.C.
1498 Flt. Sgt. E. F. Smith, R.F.C.
3793 Sgt. H. B. Stringer, R.F.C.
1428 Flt. Sgt. R. J. Tallyn, R.F.C.
2639 Flt. Sgt. L. Wardley, R.F.C.
7649 Sgt. F. A. Woodall, R.F.C.

* * *

The Albert Medal.

May 19th, 1916.

The King has been graciously pleased to award the Decoration of the Albert Medal to the undermentioned Officer, Non-commissioned Officer, and Men of His Majesty's Forces serving in France in recognition of their gallantry in saving life:—

FIRST CLASS.—Major Cyril Louis Norton Newall, 2nd Gurkha Rifles (attached R.F.C.).
SECOND CLASS.—Corporal Henry Hearne, R.F.C.
1st. Class Air Mechanic Harrie Stephen Harwood, R.F.C.
2nd Class Air Mechanic Alfred Edward Simms, R.F.C.

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FOREIGN DECORATIONS.

The Legion of Honour.

February 24th, 1916.

The President of the French Republic has bestowed the decoration of the Legion of Honour, with the approval of His Majesty the King, on the following Officers of the R.F.C. in recognition of their distinguished service during the campaign :—

Croix D'Officier.

Major and Brevet Lieut.-Col. (temp. Brig-Gen.) W. S. Brancker, Royal Artillery.

Croix de Chevalier.

Capt. and Brevet Major (temp. Lieut.-Col.) J. H. W. Becke, Notts and Derby R. and R.F.C.
Capt. (temp. Lieut.-Col.) G. W. P. Dawes, Royal Berks. R. and R.F.C.
Capt. J. T. C. Moore-Brabazon, R.F.C. (Spec. Res.)
Lieut. (temp. Capt.) H. R. Nicholl, R.F.C. (Spec. Res.).
Temp. Sec. Lieut. (temp. Capt.) E. D. Horsfall, Rifle Brigade and R.F.C.

* * *

The Croix de Guerre.

February 24th, 1916.

The President of the French Republic has bestowed the decoration "Croix de Guerre" on the undermentioned non-commissioned officers and men in recognition of their distinguished service during the campaign :—

1194 First Class Air Mechanic A. J. Bradford, R.F.C.
886 Sgt. R. G. Brobson, R.F.C.
2891 Sgt. F. T. Courtney, R.F.C.
814 Sgt. W. V. Ellison, R.F.C.
1629 Sgt. A. Randle, R.F.C.
1831 Sgt. W. Watts, R.F.C.

December 9th, 1916.

The President of the French Republic has bestowed the decoration "Croix de Guerre" on the following officers and N.C.O. in recognition of their distinguished service during the campaign :—

Major Sidney Smith, R.F.A. and R.F.C.
Capt. (temp. Major) Thomas Walter Colby Carthew, D.S.O., Bedford R. (Spec. Res.) and R.F.C.
Lieut. (temp. Capt.) Vernon Sidney Brown, R.F.C. (Spec. Res.).
Sec. Lieut. (temp. Lieut.) Malcolm Henderson, D.S.O., Seaforth Highrs. and R.F.C.
3192 Cpl. Arthur Winterbottom, late R.F.C.

The Medaille Militaire.

February 24th, 1916.

The President of the French Republic has bestowed the decoration "Médaille Militaire" on the undermentioned warrant officers, non-commissioned officers, and men, in recognition of their distinguished service during the campaign :—

555 Sgt. A. A. J. Beer, R.F.C.
152 Flt. Sgt. F. James, R.F.C.
251 Sgt.-Major J. Kemper, R.F.C.
4917 Second Class Air Mechanic F. S. Mackrell, R.F.C.
7146 Cpl. R. S. Northcote, R.F.C.

* * *

Russian Decorations.

April 14th, 1916.

The King has been pleased to give and grant unto the undermentioned Officers His Majesty's Royal licence and authority to wear Decorations (as stated against their respective names) which have been conferred upon them by His Majesty the Emperor of Russia in recognition of valuable services rendered by them :—

Fourth Class of the Order of St. Vladimir.

Major and Brevet Lieut.-Col. (temp. Brig.-Gen.) William Sefton Brancker, R.A.
Capt. and Brevet Lieut.-Col. Frederick Hugh Sykes, 15th Huss.

Second Class of the Order of St. Stanislas.

Major (temp. Lieut.-Col.) Henry Robert Moore Brooke-Popham, D.S.O., Oxfordshire and Buckinghamshire Light Infantry (General Staff Officer, First Grade, R.F.C.).

Third Class of the Order of St. Anne.

Capt. and Brevet Major (temp. Lieut.-Col.) William Dawson Beatty, R.E. and R.F.C. (Assistant Director of Military Aeronautics).
Capt. (temp. Major) Rutter Barry Martyn, Wilts R. and R.F.C.
Major William Ward Warner, late Indian Army, General Staff Officer, Second Grade.
Major Walter Buckingham Caddell, R.A., Deputy Assistant Director of Military Aeronautics.

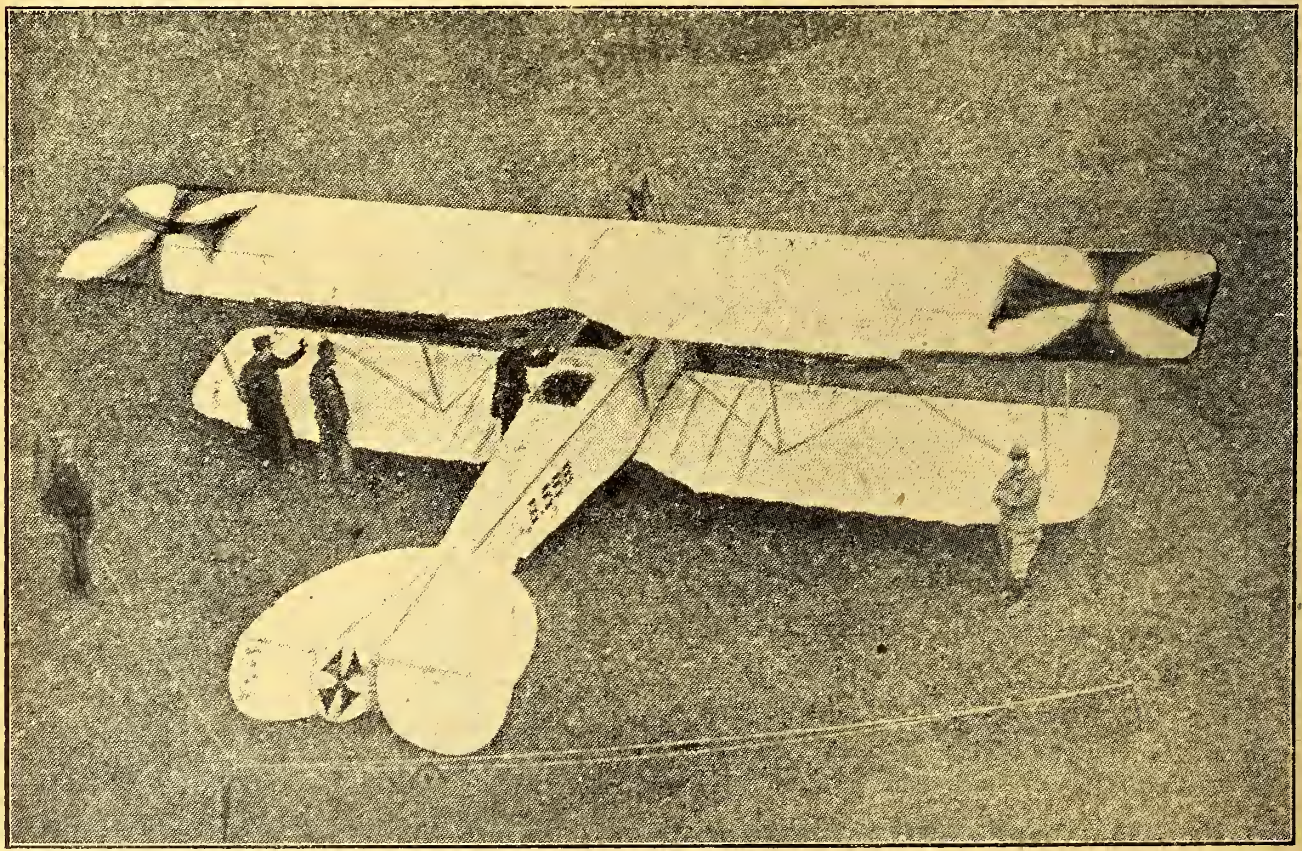
* * *

Promotion to General.

[Included in this list, as published too late for inclusion in last year's list].

December 29th, 1915.

Brigade-Commander Brevet Lieutenant-Colonel W. S. Brancker, R.A., and to be temp. Brigadier-General whilst so employed, Dec. 18th.



Reproduced by courtesy of "L'Aérophile," the French technical journal, from a photograph lent by the French Aviation Militaire.

An Aviatik biplane, type P., with extended upper plane, and large tail, viewed from above.

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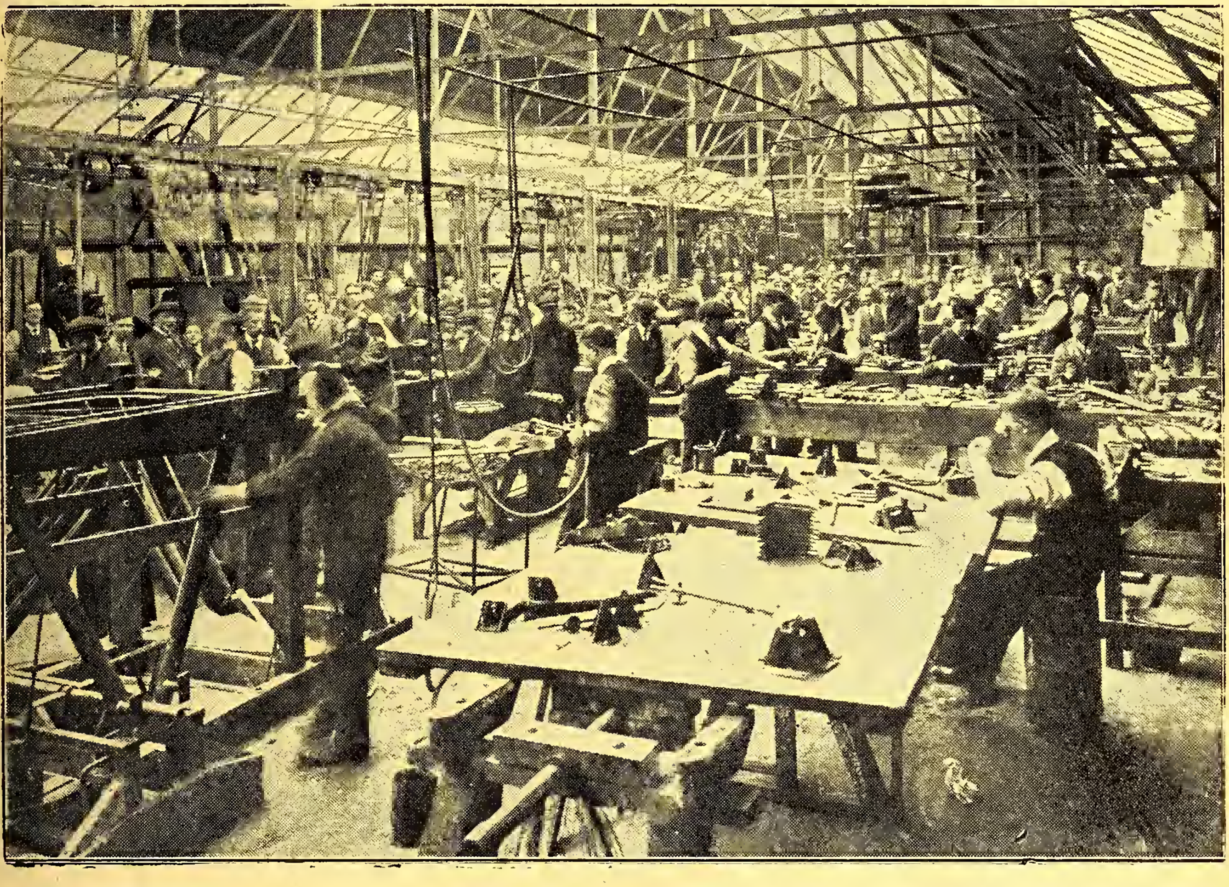

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February 16th, 1916.

Brigade-Commanders, from Wing Commanders, R.F.C., and to be temp. Brigadier-Generals whilst so employed:—February 1st: Major (temp. Lieutenant-Colonel) J. M. Salmond, D.S.O., R. Lanc.; Major (temp. Lieutenant-Colonel) T. I. Webb-Bowen, Beds.

April 26th, 1916.

Brigade-Commander:—Temp. Lieutenant-Colonel Duncan Le G. Pitcher, 39th Cent. Ind. Horse, I.A., from a Wing Commander, R.F.C., and to be temp. Brigadier-General while so employed, April 1st.

[In the Mentions in Dispatches dated June 15th, 1916, and Jan. 2nd, 1917, it appears that Brevet Lieutenant-Colonel H. R. M. Brooke-Popham, D.S.O., has been appointed temp. Brigadier-General, but no notification of the fact can be found in R.F.C. gazettes.]

July 11th, 1916.

Brigade-Commander:—Brevet Lieutenant-Colonel W. G. H. Salmond, R.A., from a Wing Commander, R.F.C., and to be temp. Brigadier-General whilst so employed, July 1st.

September 28th, 1916.

Brigade-Commander, and to be temp. Brigadier-General whilst so employed:—Brevet-Major C. A. H. Longcroft, Welsh R., from temp. Lieutenant-Colonel and Wing Commander, R.F C.

* * *

Special Promotions.

January 13th, 1916.

To be Brevet-Majors.

Captain (temp. Major) D. S. Lewis, D.S.O., R.E. and R.F.C.
Captain (temp. Major) G. S. Shephard, R. Fus. and R.F.C.

June 2nd, 1916.

Promotion for valuable services rendered in connection with the War, with effect from June 3rd, 1916, inclusive:—

To be Brevet Lieutenant-Colonel.

Major (temp. Lieutenant-Colonel) W. W. Warner, R.F.C., late Ind. Army (on retired list).

To be Brevet Lieutenant-Colonel.

Major (temp. Lieutenant-Colonel) E. M. Maitland, Essex Regt. [Wing Commander, R.N.A.S.—Airship Section.]

To be Brevet-Major.

Captain (temp. Lieutenant-Colonel) R. K. Bagnall-Wild, late R.E. (on retired list).

To be Brevet Lieutenant-Colonels.

For Distinguished Service in the Field, dated June 3rd, 1916:—

Major (temp. Lieutenant-Colonel) H. R. M. Brooke-Popham, D.S.O., Oxf. and Bucks L.I. and R.F.C.
Major (temp. Brigadier-General) J. M. Salmond, D.S.O., R. Lan. R. and R.F.C.
Major (temp. Lieutenant-Colonel) W. G. H. Salmond, R.A. and R.F.C.

December 31st, 1916, for January 1st, 1917.

To be Major-General.

Maj. and Bt. Col. (temp. Maj-Gen.) H. M. Trenchard, C.B., D.S.O., A.D.C., R. Sc. Fus.

To be Brevet-Colonel.

Lt.-Col. (temp. Brig.-Gen.) E. B. Ashmore, C.M.G., M.V.O., R.A.

To be Brevet Lieutenant-Colonels.

Capt. and Bt. Maj. (temp. Brig.-Gen.) C. A. H. Longcroft, Welsh Regt. and R.F.C.
Maj. C. C. Maradin, R.G.A.
Maj. (temp. Brig.-Gen.) D. Le G. Pitcher, Ind Army and R.F.C.
Maj. (temp. Brig.-Gen.) T. I. Webb-Bowen, Beds R. and R.F.C.
Capt. (temp. Lt.-Col.) J. G. Hearson, D.S.O., R.E., and R.F.C.
Capt. (temp. Lt.-Col.) P. L W. Herbert, Notts and Derby R. and R.F.C.
Capt. (temp. Lt.-Col.) E. R. Ludlow-Hewitt, M.C., R. Ir. Rifles and R.F.C.

To be Honorary Captain

Qrmr. and Hon. Lt. (temp. Maj.) F. H. Kirby, V.C., R.F.C.

* * *

Promotions from the Ranks for Service in the Field.

March 2nd, 1916.

To be Second Lieutenants for Service in the Field.

First Class Air Mechanic W. J. Cooper, R.F.C., February 6tr.
First Class Air Mechanic J. W. Burt, R.F.C., February 6th.

March 30th, 1916.

To be Second Lieutenants for Service in the Field.

W. Riding R.—Acting Sergeant-Major A. Hunter, from R.F.C., March 5th.
Oxford and Bucks L.I.—Sergeant-Major E. McEvoy, from R.F.C., February 27th.
Royal Irish R.—First Class Air Mechanic W. Wood, R.F.C., March 12th.

To be Temp. Second Lieutenants for Duty with R.F.C.

Flight-Sergeant T. C. Noble, from R.F.C., March 5th.
Sergeant T. P. H. Bayetto, from R.F.C., March 12th.

April 6th, 1916.

To be Temp. Second Lieutenant.

First Class Air Mechanic Leslie Murden Page, from R.F.C., for duty with that Corps, March 24th, 1916.

April 20th, 1916.

To be Temp. Second Lieutenants.

First Class Air Mechanic Raymond John Everest, March 26th, 1916.
Flight Sergeant Frank Nuttall, April 6th, 1916.
Second Class Air Mechanic Alfred Jasper Oscar Spiers, April 6th, 1916.

May 17th, 1916.

To be Second Lieutenants for Service in the Field.

Royal Regiment of Artillery.—Sergeant L. S. Dell, from R.F.C., and to be secd. for duty with R.F.C., April 16th.
Royal Dublin Fus.—Acting Sergeant-Major M. Keegan, from R.F.C., and to be secd. for duty with R.F.C., April 23rd.

To be Temp. Second Lieutenants for Duty with R.F.C.

First Class Air Mechanic A. G. Powell, from R.F.C., April 16th.
Second Class Air Mechanic A. Hughes, from R.F.C., April 16th.

May 29th, 1916.

To be Temp. Second Lieuts., on Prob., for Duty with R.F.C.

Corporal E. E. Castle, from R.F.C., April 30th.
Second Class Air Mechanic L. Taylor, from R.F.C., May 7th.

June 14th, 1916.

To be Second Lieutenant for Service in the Field.

Infantry.—R.W. Sur. R.—Sergeant-Major W. F. Bryant, from R.F.C., and to be secd. for duty with R.F.C., May 16th.

December 7th, 1916.

To be Temp. Second Lieutenants, on Probation, for Service in the Field.

Sergeant E. H. Trump, from R.F.C., November 10th.
First Class Air Mech. S. de Freitas, from R.F.C., Nov. 10th.
Second Class Air Mech. A. G. S. de Ross, from R.F.C., Nov. 10.
Sergeant W. D. Matheson, from R.F.C., November 12th.

July 3rd, 1916.

To be Temp. Second Lieutenants for Duty with R.F.C.

Sergeant H. V. Jerrard, from R.F.C., June 4th.
Flight-Sergeant W. B. Everton, from R.F.C., June 12th.
Flight-Sergeant A. S. Morris, from R.F.C., June 12th.
Sec. Cl. Air Mech. C. I. Sandys-Thomas, from R.F.C., June 12.
First Class Air Mechanic H. E. Hervey, from R.F.C., June 14th.

July 15th, 1916.

To be Temp. Second Lieuts., on Prob., for Duty with R.F.C.

Second Class Air Mechanic Fritz Bowyer, from R.F.C., June 17th.
First Class Air Mechanic T. V. Brake, from R.F.C., June 23rd.
Second Class Air Mechanic J. R. Evans, from R.F.C., June 25th.

July 28th, 1916.

To be Temp. Second Lieutenants, on Probation.

Sgt. T. E. Drowley, from R.F.C., for duty with R.F.C., June 26.
Sgt. C. K. Shepherd, from R.F.C., for duty with R.F.C., July 2.
Sgt. P. S. Williams, from R.F.C., for duty with R.F.C., July 2.

August 18th, 1916.

To be Temp. Sec. Lieuts. (on prob.) for Duty with R.F.C.

First Class Air Mechanic G. M. G. Bibby, from R.F.C., July 19th.

November 25th, 1916.

To be Second Lieutenants for Service in the Field.

Sergeant Henry L. Pateman, from R.F.C., October 26th.
First Class Air Mechanic Ernest W. Dexter, from R.F.C., October 26th.
Flight Sergeant William F. Leech, from R.F.C., October 27th.
Sergeant James R. W. Thompson, from R.F.C., October 27th.
Sergeant Stanley Cockerell, from R.F.C., October 27th.

December 20th, 1916.

To be Second Lieutenants for Service in the Field.

Actg. Sgt.-Major J. D. Payne, from R.F.C., Oct. 30th.
Corporal B. Ankers, from R.F.C., November 5th.

August 23rd, 1916.

To be Temp. Sec. Lieuts. (on prob.) for Duty with R.F.C.

Actg. Sgt.-Major D. B. Cleghorn, from R.F.C., July 25th.
1st Cl. Air Mech. William J. R. Sheppard, from R.F.C., July 26th.
2nd Cl. Air Mech. F. T. Nettleingham, from R.F.C., July 26th.
2nd Cl. Air Mech. John. W. Maddock, from R.F.C., July 26th.

September 2nd, 1916.

To be Temp. Second Lieutenants for Service in the Field.

South Lancashire R.—Sgt.-Major Joseph Kemper, from R.F.C., and to be seconded for duty with R.R.C., August 1st.
Seaforth Highlanders.—Sgt.-Major James McCrae, from R.F.C. and to be seconded for duty with R.F.C., August 2nd.

To be Temp. Second Lieutenants, on Probation.

Corporal Michael P. Mullery, from R.F.C., July 12th.
Sergeant Thomas S. L. Mann, from R.F.C., August 2nd.

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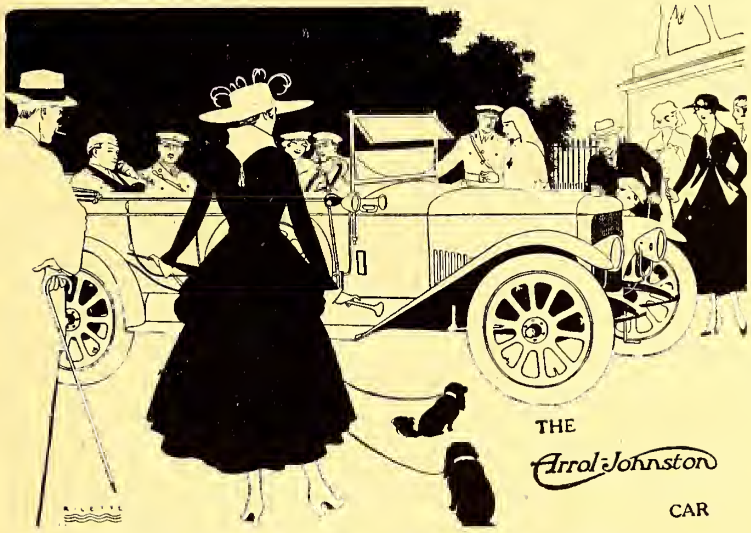

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Flight-Sergeant John Beavis Waddoup, from R.F.C., August 4th.
Sergeant Reuben John Muxworthy, from R.F.C., August 4th.
First Class Air Mechanic Bertram Pool, from R.F.C., August 4th.
First Class Air Mechanic Henry Starbuck Wilkins, from R.F.C., August 4th.
First Class Air Mechanic Norman Glover, from R.F.C., Aug. 4th.
First Class Air Mechanic Leonard Norris, from R.F.C., Aug. 4th.

September 7th, 1916.

TO BE SECOND LIEUTENANT FOR SERVICE IN THE FIELD.

BORDER REGT.—Sergeant-Major H. V. Robbins, from R.F.C., and to be seconded for duty with R.F.C., August 8th.

TO BE TEMP. SECOND LIEUTENANTS, ON PROBATION.

Sgt. J. E. Bonniksen, from R.F.C.; Cpl. L. G. Stevenson, from R.F.C.; Cpl. W. G. Morgan, from R.F.C.; Cpl. H. Howells, from R.F.C.; 1st. Cl. Air Mech. H. F. B. Bryan, from R.F.C.; 1st Cl. Air Mech. G. L. Eliot, from R.F.C.; 1st Cl. Air Mech. H. F. N. Paull, from R.F.C. (August 8th). Flt. Sgt. A. Muir, from R.F.C.; 1st Cl. Air Mech. H. F. B. Bryan, from R.F.C.; 2nd Cl. Air Mech. C. H. Marchant, from R.F.C.; 2nd Cl. Air Mech. J. P. Burden, from R.F.C. (August 10th). Cpl. H. A. Blanchard, from R.F.C.; 1st Cl. Air Mech. L. Wigley, from R.F.C.; 1st Cl. Air Mech. L. A. Goss, from R.F.C.; 1st Cl. Air Mech. C. H. C. Hawkes, from R.F.C. (August 14th).

September 28th, 1916.

TO BE SECOND LIEUTENANTS FOR SERVICE IN THE FIELD.

Sgt. C. E. Morgan, from R.F.C. (July 12th). Sgt. G. Lacey, from R.F.C., Cpl. J. H. A. Byrne, from R.F.C., 2nd Cl. Air Mech. C. W. O'Neill-Ready, from R.F.C. (August 17th). 1st Cl. Air Mech. S. Mercer, from R.F.C. (August 21st). Sgt. J. E. Macloghlin, from R.F.C. (August 22nd). Flt. Sgt. B. E. Hobbs, from R.F.C. (August 27th).

October 7th, 1916.

TO BE SECOND LIEUTENANT FOR SERVICE IN THE FIELD.

Cpl. C. H. Blakeway, from R.F.C., September 3rd.

October 23rd, 1916.

TO BE TEMP. SECOND LIEUTENANTS, ON PROBATION.

Cpl. C. T. Keble, from R.F.C.; 1st Cl. Air Mech. J. Watson, from R.F.C.; 1st Cl. Air Mech. C. H. Mendham, from R.F.C.; 2nd Cl. Air Mech. W. W. Fitzgerald, from R.F.C., September 19th. 2nd Cl. Air Mech. J. G. Beckham, from R.F.C.

October 30th, 1916.

TO BE SECOND LIEUTENANTS FOR SERVICE IN THE FIELD.

October 6th: Flt Sgt. Stanley Frost, from R.F.C. October 9th, 1916: 1st Cl. Air Mech. Charles John Geddes, from R.F.C.; 2nd Cl. Air Mech. Leonard Ernest Yeomans, from R.F.C.; 2nd Cl. Air Mech. William Le Lorraine, from R.F.C.

November 8th, 1916.

TO BE TEMP. SEC. LIEUTS. (ON PROB.), FOR SERVICE IN THE FIELD.

Sgt. Samuel Jolley, from R.F.C., October 10th. October 13th: Act. Sgt.-Maj. Fred Knight, from R.F.C.; Act. Sgt. John William Askham, from R.F.C.; 2nd Cl. Air Mech. Reginald George Shackel, from R.F.C. October 14th: 1st Cl. Air Mech. Patrick Scott Riach, from R.F.C. October 15th: 1st Cl. Air Mech. Charles Albany Stevenson, from R.F.C.

November 18th, 1916.

TO BE TEMP. SECOND LIEUTENANTS ON PROBATION.

Cpl. C. J. Strother, from R.F.C., Cpl. C. H. Parker, from R.F.C., October 15th. 1st Cl. Air Mech. C. J. Pell, from R.F.C., October 16th. Cpl. J. G. Plester, from R.F.C., October 21st. 2nd Cl. Air Mech. A. H Steele, from R.F.C., Oct. 23rd.

December 23rd, 1916.

TO BE TEMP. SECOND LIEUTENANTS.

Qrmr.-Sgt. R. H. Bright, from R.F.C., for duty with R.F.C., Dec. 24th. Acting Sgt.-Maj. F. J. B. Powell, from R.F.C., Nov. 16th. Qrmr.-Sgt. W. Thorne, from R.F.C., Nov. 16th. 2nd Cl. Air Mech. L. C. Row, from R.F.C., Nov. 17th.

December 29th, 1916.

TO BE TEMP. SEC. LIEUTS. (ON PROB.), FOR SERVICE IN THE FIELD.

Sgt. A. B. Coupal, from R.F.C.; Sgt. W. F. Macdonald, from R.F.C.; 2nd Cl. Air Mech. W. A. Winter, from R.F.C., Dec. 2nd.

(Issued on December 31st for publication on January 1st.)

* * *

Mention in Despatches.

January 1st, 1916.

A Supplement to the "London Gazette" of December 31st, dated January 1st, gives the names of those whom Field-Marshal Sir John French recommends (under date November 30th) for gallant and distinguished conduct in the field.

ROYAL FLYING CORPS.

Acland, Sec. Lieut. (temp. Lieut.) W. H. D., Royal 1st Devon Yeomanry; Adamson, Lieut. (temp. Capt. in Army) W. C., Special Reserve; Andrews, Sec. Lieut. J. O., Royal Scots; Ashmore, Lieut.-Col. E. B., M.V.O., Royal Artillery.

Babington, Sec. Lieut. (temp. Capt.) P., Hampshire Regt. (T.F.); Baldwin, Sec. Lieut. (temp. Lieut.) J. E. A., 8th Hussars; Baring, Lieut. Hon. M., Special Reserve; Barrington-Kennett, Capt. V. A., Special Reserve; Barratt, Lieut. (temp. Capt.) A. S., Royal Artillery; Becke, Brev. Maj. (temp. Lieut.-Col.) J. H. W., Nottinghamshire and Derbyshire Regt.; Bell-Irving, Capt. M. McB., Special Reserve; Birch, Lieut. (temp. Capt.) W. C. K., Yorkshire Regt.; Blackburn, Capt. H., Special Reserve; Board, Maj. A. G., South Wales Borderers; Boyle, Capt. (temp. Maj.) Hon. J. D., Rifle Brigade; Bradley, Capt. C. R. S., 4th Cavalry, Indian Army; Brancker, Brev. Lieut.-Col. W. S., Royal Artillery; Brock, Capt. H. Le M., Royal Warwickshire Regt.; Burke, Brev. Maj. (temp. Lieut.-Col.) C. J., D.S.O., Royal Irish Regt.; Bush, Sec. Lieut. E., Special Reserve.

Capel, Sec. Lieut. A. J., Somerset Light Infantry; Cemlyn-Jones, Lieut. J., Royal Welsh Fusiliers (T.F.); Charlton, Maj. (temp. Lieut.-Col.) L. E. O., D.S.O., Lancashire Fusiliers; Christie, Capt. A., Royal Artillery; Cleaver, Temp. Capt. F. H.; Cooper, Sec. Lieut. H. A., Special Reserve.

Darley, Lieut. (temp. Capt.) C. C., Royal Artillery; Dawes, Capt. (temp. Maj.) G. W. P., Royal Berkshire Regt.; de Haviland, Capt. H., Special Reserve; Douglas, Lieut. W. S., Royal Field Artillery, Special Reserve; Dowding, Capt. (temp. Maj.) H. C. T., Royal Artillery.

Evans, Temp. Lieut. A. J., Special List.

Festing, Maj. F. L., Northumberland Fusiliers; Filley, Lieut. O. D., Special Reserve.

Gilbert, Sec. Lieut. E. M., Essex Regt., Special Reserve; Glanville, Capt. H. F., West India Regt.; Glen, Sec. Lieut. D. A., Manchester Regt.; Gossage, Lieut. (temp. Capt.) E. L., Royal Artillery; Gower, Capt. E. L. M. L., Special Reserve; Greenwood, Temp. Sec. Lieut. B. P., Special List; Grenfell, Lieut. (temp. Capt.) E. O., Royal Artillery; Grey-Edwards, Temp. Sec. Lieut. H. B. R., Royal Artillery.

Hearson, Capt. J. G., Royal Engineers; Hellyer, Lieut. (temp. Capt. in Army) F. E., Hampshire Regt. (T.F.); Higgins, Brev. Lieut.-Col. (temp. Brig.-Gen.) J. F. A., D.S.O., Royal Artillery; Horsfall, Temp. Capt. E. D.; Hyde, Temp. Sec. Lieut. E. L.

Insall, Temp. Sec. Lieut. A. J.

Jackson, Capt. J. L., Connaught Rangers, Special Reserve; James, Lieut. (temp. Capt.) B. T., Royal Engineers (killed).

Kinnear, Lieut. (temp. Capt.) J. L., Liverpool Regt.

Lawrence, Lieut. (temp. Capt.) G. A. K., D.S.O., Royal Artillery; Lewis, Capt. (temp. Maj.) D. S., D.S.O., Royal Engineers; Long, Sec. Lieut. S. H., Durham Light Infantry; Longcroft, Brev. Maj. (temp. Lieut.-Col.) C. A. H., Welsh Regt.; Longstaff, Maj. R., Royal Field Artillery; Loraine, Capt. R., Special Reserve; Lubbock, Temp. Lieut. Hon. E. F. P., Army Service Corps; Ludlow-Hewitt, Capt. (temp. Maj.) E. R., Royal Irish Rifles.

Marshall, Capt. A., D.S.O., 28th Cavalry, Indian Army; Medlicott, Temp. Sec. Lieut. H. W.; Mills, Lieut. (temp. Capt.) G. D., Nottinghamshire and Derbyshire Regt.; Mitchell, Capt. W. G. S., Highland Light Infantry; Mitchell, Sec. Lieut. (temp. Capt.) E. H., Royal Artillery; Moore-Brabazon, Capt. J. T. C., Special Reserve.

Nicholl, Lieut. (temp. Capt. in Army) H. R., Special Reserve.

Parker, Temp. Lieut. A. H. (Lieut. Punjab Volunteer Rifles); Peck, Temp. Sec. Lieut. R. H., Dorset Regt.; Pike, Lieut. (temp. Capt. in Army) R. M., Special Reserve; Pinney, Sec. Lt. J. C. W. A., Royal Fusiliers; Playfair, Lieut. (temp. Capt.) P. H. L., Royal Artillery; Popham, Maj. G. L., Royal Artillery; Porter, Capt. G. T., Royal Artillery, Powell, Capt. (temp. Lieut. in Army) E. W., Unattached List (T.F.); Powell, Temp. Lieut. F. J.

Ramsay, Qmr. and Hon. Lieut. (temp. Capt.) J.; Read, Lieut, (temp. Capt.) W. R., 1st Dragoon Guards, Rees, Capt. L. W. B., Royal Artillery; Reynolds, Brev. Maj. H.R.P., Royal Engineers; Rumbold, Sec. Lieut. R. S., Somerset Light Infantry; Russell, Temp. Lieut. J. C., Royal Engineers (Sec. Lieut. Royal Engineers T.F.); Ryan, Lieut. (temp. Capt.) C. E., Royal Field Artillery.

Salmond, Maj. (temp. Lieut.-Col.) W. G. H., Royal Artillery; Salmond, Brev. Maj. (temp. Lieut.-Col.) J. M., D.S.O., Royal Lancaster Regt.; Saunders, Temp. Lieut. R. A., Royal Field Artillery (T.F.); Scholefield, Sec. Lieut. E. R. C., Lancashire Fusiliers; Shephard, Capt. (temp. Maj.) G. S., Royal Fusiliers; Shield, Temp. Sec. Lieut. H. S.; Simpson, Lieut. (temp. Capt.) F. W. H., Royal Garrison Artillery; Simpson, Sec. Lieut. H. R. D., 6th Dragoons; Sison, Temp. Lieut. H. M., Army Service Corps; Smith, Capt. T. V., Special Reserve; Somervail, Lieut. A., King's Own Scottish Borderers (T.F.); Spratt, Capt. N. C., Special Reserve; Steel, Lieut. J. V., Royal Garrison Artillery; Symington, Sec. Lieut. D. A. C., Special Reserve.

Thomson, Sec. Lieut. (temp. Capt.) A. A. B., Royal Warwickshire Regt.

Vagg, Sec. Lieut. H. R., Somerset Light Infantry; Vaucour, Temp. Sec. Lieut. A. M., Royal Field Artillery; Verney, Lieut. (temp. Capt.) R. H., Army Service Corps.

Webb-Bowen, Maj. (temp. Lieut. Col.) T. I., Bedfordshire Regt.; Woodhouse, Sec. Lieut. J. W., Special Reserve.

Yule, Sec. Lieut. L. W., Special Reserve.

Angell, No. 297 Actg. Sgt.-Maj. J. P.; Armstrong, No. 160 Sgt. A. W.; Armstrong, No. 1983 Sgt. A.; Beer, No. 555 Sgt. A. A. J.; Bethell, No. 348 Sgt. H. E.; Brown, No. 812 Flight Sgt. G.; Chapman, No. 728 Cpl. G. S.; Elstow, No. 1164 1st Class Air Mechanic W.; Hawley, No. 1025 Cpl. A.; Hunter, No.

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January 27th, 1916.

Cant (temp. Maj.) A. E. Borton, D.S.O., Royal Highlanders. [An addendum to the previous dispatch.]

May 19th, 1916.

No. 2 Squadron, R.F.C.
No. 6 Squadron, R.F.C.
[Specially mentioned for good work in France.]

June 6th, 1916.

Lord French, the Field Marshal Commanding-in-Chief, Home Forces, has recommended to the Army Council the names of the following officers for distinguished service in connection with the defence of London against hostile air raids:—

Maj. F. V. Holt, D.S.O., Oxford and Bucks L.I. and R.F.C. Maj. T. C. R. Higgins, R. Lancaster Regt. and R.F.C. Sec. Lt. A. de B Brandon, R.F.C. (S.R.). Sec. Lt. C. A. Ridley, R. Fusiliers and R.F.C.

June 15th.

The dispatch from General Sir Douglas Haig, C.-in-C. of the British Forces in France, mentions the following:—

Staff.—Trenchard, Brevet Col. (temp. Maj. Gen.) H. M., C.B., D.S.O., A.D.C., R. Sc. Fus.

ROYAL FLYING CORPS.

Brooke-Popham, Maj. (temp. Brig.-Gen.) H. R. M., D.S.O., Oxford and Bucks L.I.

Salmond, Maj. (temp. Brig-Gen.) J. M., D.S.O., R. Lanc. R.

Donaldson-Hudson, Maj. R. C. (T.F. Reserve). Hynes, Capt. (temp. Maj.) G. B., R.A. Newall, Major, (temp. Lt.-Col.) C. L. N., 2nd Gurkha Rif. Bourke, Capt. (temp. Maj.) U. J. D., Oxf. and Bucks L.I. Harvey-Kelly, Capt. (temp. Maj.) H. D., D.S.O., R. Ir. Reg. MacNeece, Capt. (temp. Maj.), W. F., R. W. Kent R.

Bell-Irving, Capt. M. McB., D.S.O. (Spec. Res.). Bettington, Capt. A. V. (Spec. Res.). Cooper, Lt. (temp. Capt. in Army) H. L. (Spec. Res.). Erskine, Temp. Lt. R., R. Sc. Fus. (Service Bn.). Grubb, Capt. R. R. de C., 3rd Hrs. Lewis, Capt. R. E., W.I.R.

Morison, Lt. (temp. Capt.) A. M. (Spec. Res.). Morton, Lt. (temp. Capt.) A. H., R.F.A. Tennant, Capt. J. E., S. Gds. Wynne-Eyton, Temp. Capt C. S. (Spec. List). Cunningham, Lt. (temp. Capt.) J. A., R.F.A. Oxenham, Lt. (temp. Capt.) H. A. (Spec. Res.).

Adams, Lt. A. B. (Spec. Res.). Child, Sec. Lt. (temp. Lt.) A. J. Lond. R. (T.F.). De Courcy, Lt. J. A. G., R.G.A., Milne, Temp. Lt. J. T., Oxford and Bucks L.I. Murray, Lt. (temp. Capt.) K. D. P. (Spec. Res.). Norman, Temp. Lt. G. H. (Spec. Res.).

Russell, Lt. H. B., R.F.A. Allcock, Sec. Lt. (temp. Capt.) W. T. L. (Spec. Res.). Babington, Sec. Lt. (temp. Capt.) P., Hamps. R. Goldsmith, Sec. Lt. (temp. Capt.) N., R.A. Henderson, Sec. Lt. (tempt. Lt.) M., D.S.O., Sea. Highrs. Boyton, Temp. Sec. Lt. G. G. (Spec. List).

Faber, Sec. Lt. C. (Spec. Res.). Hallam, Temp. Sec. Lt. W. A. W., A.S.C. Hughes, Temp. Sec. Lt. T. McK., K.R.R. Mackay, Sec. Lt. H. A. D., Hamps. R. Medhurst, Sec. Lt. C. E. H., R. Innis. Fus. Morris, Temp. Sec. Lt. J. (Spec. List).

Plenty, Lt. E. P., Manch. R. Solomon, Temp. Sec. Lt. J. B., Oxf. and Bucks L.I. Thayre, Sec. Lt. F. J. H. (Spec. Res.). Vagg, Sec. Lt. H. R., Som. L.I. Mead, Qrmr. and Hon. Lt. J. Starling, Qrmr. and Hon. Lt. (temp. Capt. in Army) J.

McCrae, 174 Sgt.-Maj. J. Robrins, 263 Sgt.-Maj. H. V. Fulton, 1112 Acting Sgt.-Maj. J. (Flight Sgt.). Hayward, 255 Acting Sgt.-Maj. W. C. (Flight Sgt.). Fitzgerald, 1705 Flight. Sgt. M. B. Foster, 2292 Sgt. R. G. Greenup, 2443 Sgt. B. G. Hunt, 2057 Sgt. H. E. Mantell, 3599 Sgt. W. G. Newton, 217 Flight Sgt. D. H. Northcote, 7146 Sgt. R. S. Rapley, 1027 Sgt. C. Storey, 184 Flight Sgt. J. Hepple, 780 Corpl. G. W. Isles, 1961 Corpl. A. Bell, 4310 1st Cl. Air Mech. G. D. Green, 1711 1st Cl. Air Mech. G. Lathean, 681 1st Cl. Air Mech. J. A. McSwiney, 3799 1st Cl. Air Mech. T. L. Shearing, 5853 Corpl. S.

June 21st, 1916.

ROYAL FLYING CORPS.

Canal Defences, Egypt.—Massy, Bt.-Maj. S. D., 29th Punjabis. Reilly, Capt. and Bt.-Maj. H. L., 82nd Punjabis. Rickards, Capt. G. B., Spec. Res. Royle, Capt. L. V. A. Ross, Bt.-Maj. A. J., R.E. Tweedie, Lt. D. R.

Part I.—Operations on Western Front.—Royal Flying Corps.—Bt.-Maj. A. J. Ross, R.E.; Capt. A. G. Moore, Manch. R., Spec. Res.; temp. Capt. H. A. Van Ryneveld; Lt. (temp. Capt. in Army) R. J. Tipton, R.F.A., T.F.

Part II.—Administration in Egypt.—Royal Flying Corps.—Bt.-Maj. S. D. Massy, 29th Punjabis, attached R.F.C.

List of Recommendations.—Royal Flying Corps.—Jenkins, Capt. F. H., Spec. Res.; Ross, Capt. and Bt.-Maj. A. J., R.E.; Wellesley, Capt. Lord George, G. Gds.; Colman, Sec. Lt. E. H., R.F.A., T.F.; Stent, Sec. Lt. F. W., Spec. Res.; Girod, Sec. Lt. M., Ches. R., Spec. Res.; (died of wounds).

June 30th, 1916.

From the dispatch from Lt.-Gen. the Hon. J. C. Smuts, Commander-in-Chief, East African Force:—

Royal Flying Corps.—Creed, Temp. Capt. G. S.; Emmett, Temp. Lt. E. C. Griffin, Temp Lt. E. R. M.; Bell, Sec. Lt. W. D. M., Spec. Res.; Brett, Sec. Lt. F. W., Spec. Res.

July 13th, 1916.

Recommendations made by Major-General Townshend in Mesopotamia:—

Royal Flying Corps.—Fulton, Sec. Lt. E. J., 1st Duke of York's Own Lancers (Skinner's Horse); Hundey, Capt. S. C. B., Oxf. and Bucks, L.I.; Petre, Capt. H., Commonwealth Mil. Forces; White, Capt. T. W., Commonwealth Mil. Forces.

September 25th, 1916.

From the dispatch, dated June 1st, from General Sir Archibald Murray, Commander-in-Chief of the Egyptian Expeditionary Force:—

Royal Flying Corps.—Salmond, Bt. Lt.-Col. (temp. Lt.-Col.) W. G. H., R.A.; Freeman, Capt. (temp. Maj.) W. R., Manch. R.; Blackburn, Capt. H., Spec. Res.; Lucas, Lt. (temp. Capt.) Rt. Hon. A. T., Lord, Hants Yeo; Rowden, Lt. (temp. Capt.) C. R., Worc. R.; Minchin, Lt. (temp. Capt.) F. F., Can. Local Forces; Bellamy, temp. Lt. F., Gen. List, New Armies; Gardner, Sec. Lt. (temp. Lt.) G. D.; Yorks R., Spec. Res.; Hill, Sec. Lt. C. W., Spec. Res.; Davies, Sec. Lt. T. G.; Baillie, temp. Sec. Lt. W., Gen. List, New Armies; May, No. 167 Flt. Sgt. A. R.; Meynell, No. 2988 Flt. Sgt. E.; Green, No. 136 Flt. Sgt. H.; Hellyer, No. 718 Flt. Sgt. F. J.; Whilton, No. 198 Sgt.-Maj. F.; Felstead, No. 605 Sgt.-Maj. G.

October 19th, 1916.

From the dispatch from Lt.-Gen. Sir Percy Lake, Commanding the Indian Expeditionary Force in Mesopotamia from Jan. 19th to April 30th, the period including the efforts in the further attempt to relieve Kut.

Staff and Headquarters.—Broke-Smith, Capt. (temp. Maj.) P. W. L., R.F.C.

Royal Flying Corps.—Cuff, Lt. R. E., N. Lanc. R., Spec. Res.; Dickinson, Lt. T. M., 16th Cav.; Thomson-Glover, Capt. J. W., 35th Sikhs; Massy, Bt.-Maj. S. D., D.S.O., 29th Punjabis; McCrindle, Sec. Lt. I. R., Spec. Res.; Orton, Lt. (temp. Capt.) J. O. C., Norfolk R.; Petre, Capt. H., Australian F.C.; Wills, Sec. Lt. (temp. Capt.) W. R., Ind. Army Res. of Officers.

Mackinalty, No. 43 Flt. Sgt. G. J. W.; Tomlinson, No. 4474 Flt. Sgt. R. J.; Webb, No. 4477 Flt. Sgt. A.

The Government of India has received from Lt.-Gen. Sir Percy Lake the name of the following officer recommended by Maj.-Gen. Townshend for distinguished service during the defence of Kut-el-Amara:—

Royal Flying Corps.—Winfield Smith, Flt. Comdr. S. C., Capt. E. Surr. R., Spec. Res.

October 25th, 1916.

From the dispatch from General Sir Reginald Wingate, Sirdar and Governor-General of the Soudan, describing the military operations undertaken in the early part of 1916 against Ali Dinar, Sultan of Darfur:—

Royal Flying Corps.—Bannatyne, Lt. (temp. Maj.) E. J., 19th Hussars; Groves, Maj. (temp. Lt.-Col.) P. R. C., Shropshire L.I.; Slessor, Lt. J. C., Spec. Res.

Batty, 2197 Flt. Sgt. F.; Hemming, 3724 Sgt. H. A.; Horton, 3682 1st Class Air Mechanic T.; Maddams, 4745 Pte. G., Army Service Corps.

December 1st, 1916.

From the dispatch, dated Oct. 1st, from General Sir Archibald

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Murray, C.-in-C. Egyptian Expeditionary Force, covering the operations of his force between June 1st and Sept. 30th, 1916:—

"Special commendation is due to Lt.-Colonel P. B. Joubert, Officer Commanding R.F.C., and to Major H. Blackburn, R.F.C., who commanded the detachment at Kantara."

From a second dispatch, dated Oct. 13th:—

R.F.C.—Groves, Maj. (temp. Lt.-Col.) P. R. C., Shrops. L.I.; Carden, Maj. (temp. Lt.-Col.) A. D., R.E.; Joubert de la Ferté, Capt. (temp. Lt.-Col.) P. B., R.A.; Fraser, Capt. C., N. Staff. R.; Albrecht, Capt. V. A., M.C., Manch. R.; Grant-Dalton, Capt. S., D.S.O., York R.; Jenkins, Capt. F. H., Spec. Res.; Watt, Capt. O., Australian F.C.; Minchin, Lt. (temp. Capt.) F. F., M.C., Spec. Res.; Tipton, Lt. (temp. Capt.) R. J., R.F.A.; Pretyman, Lt. E. R., Som. L.I.; James, Lt. H. H., Manch. R.; MacLaren, Sec. Lt. A. S. C., M.C., K.O.S.B. (Spec. Res.); Coates, Sec. Lt. W. A.; Brown, temp. Sec. Lt. J., R.F.A. (died of wounds); Minter, Sec. Lt. M., Spec. Res.; West, temp. Sec. Lt., T. J.; Muir, temp. Sec. Lt. S. K.; Paris, temp. Sec. Lt. D. K., M.C.; McMahon, 1st Cl. Wt. Officer P., Australian F.C.

Harman, No. 222 Flt.-Sergt. C. J., A.F.C.; Lewis, No. 63 Flt.-Sergt. A. E.; King, No. 874 Flt.-Sergt. C. R.; Hunt, No. 3552 Cpl. J. S.; Roberts, No. 3201 Cpl. A.; Bacon, No. 265 1st. Cl. Air Mech. L. B., A.F.C.; Cox, No. 3068 Cpl. A.; Holmes, No. 3094 1st Cl. Air Mech. H.

December 6th, 1916.

From a dispatch, dated Oct. 8th, from Lt.-General G. F. Milne, commanding the British Forces at Salonika, describing the operations during the summer on the Struma and Dorian-Vardar Fronts:—

R.F.C.—Dawes, Maj. (temp. Lt.-Col.) G. W. P., R. Berks R.; Hudson, Capt. F.; Preston, Lt. O. I., Notts and Derby R.; Green, temp. Sec. Lt. (temp. Lt.) G. W. M.; Thornton, Sec. Lt. (temp. Lt.) H. G., North'n R.

Whilton, No. 198 Sergt.-Maj. F.; Dorsey, No. 2169 Sergt. F.

* * *

From the Supplement to "London Gazette," to be dated Jan. 4th.

War Office, Jan. 2nd, 1917.

The dispatch received by the Secretary of State for War from General (now Field-Marshal) Sir Douglas Haig, G.C.B., Commander in Chief of the British Armies in France, and dated General Headquarters, November 13th, 1916, contains the following list of names of those officers, non-commissioned officers and men of the R.F.C., or concerned with the R.F.C., serving, or who have served, under his command, whose distinguished and gallant services and devotion to duty he considers deserving of special mention.

STAFF.

Lt.-Col. (temp. Brig.-Gen.) E. B. Ashmore, C.M.G., M.V.O., R.A.
Brevet Lt.-Col. (temp. Brig.-Gen.) H. R. M. Brooke-Popham, D.S.O., Oxf. and Bucks L.I.
Capt. (temp. Maj.) A. Christie, R.A. and R.F.C.
Brevet Col. (temp. Major-Gen.) H. M. Trenchard, C.B., D.S.O., A.D.C., R. Scots Fus.
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Lt. F. Billinge, Manch. R., Spec. Res.
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Capt. (temp. Major) H. le M. Brock, D.S.O., R. War. R.
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Sec. Lt. P. R. Burchall, Spec. Res.
Major A. B. Burdett, York and Lanc. R.
Sec. Lt. (temp. Capt.) G. A. Burney, Sco. Horse (killed).
Sec. Lieut. (temp. Capt.) P. A. Byrne, R.F.A.
Capt. (temp. Major) T. A. E. Cairnes, D. Gds.
Capt. (temp. Maj.) J. A. Chamier, Ind. Army.
Lt. (temp. Capt.) H. B. T. Childs, Spec. Res.
Temp. Major F. H. Cleaver, Special List.
Lt. (temp. Capt.) G. L. Cruikshank, D.S.O., M.C., Gor. Highrs.
Lt. (temp. Capt.) S. A. Currin, Spec. Res.
Lt. (temp. Capt.) C. J. W. Darwin, C. Gds.
Capt. (temp. Lt.-Col.) R. C. Donaldson-Hudson, T.F. Res.
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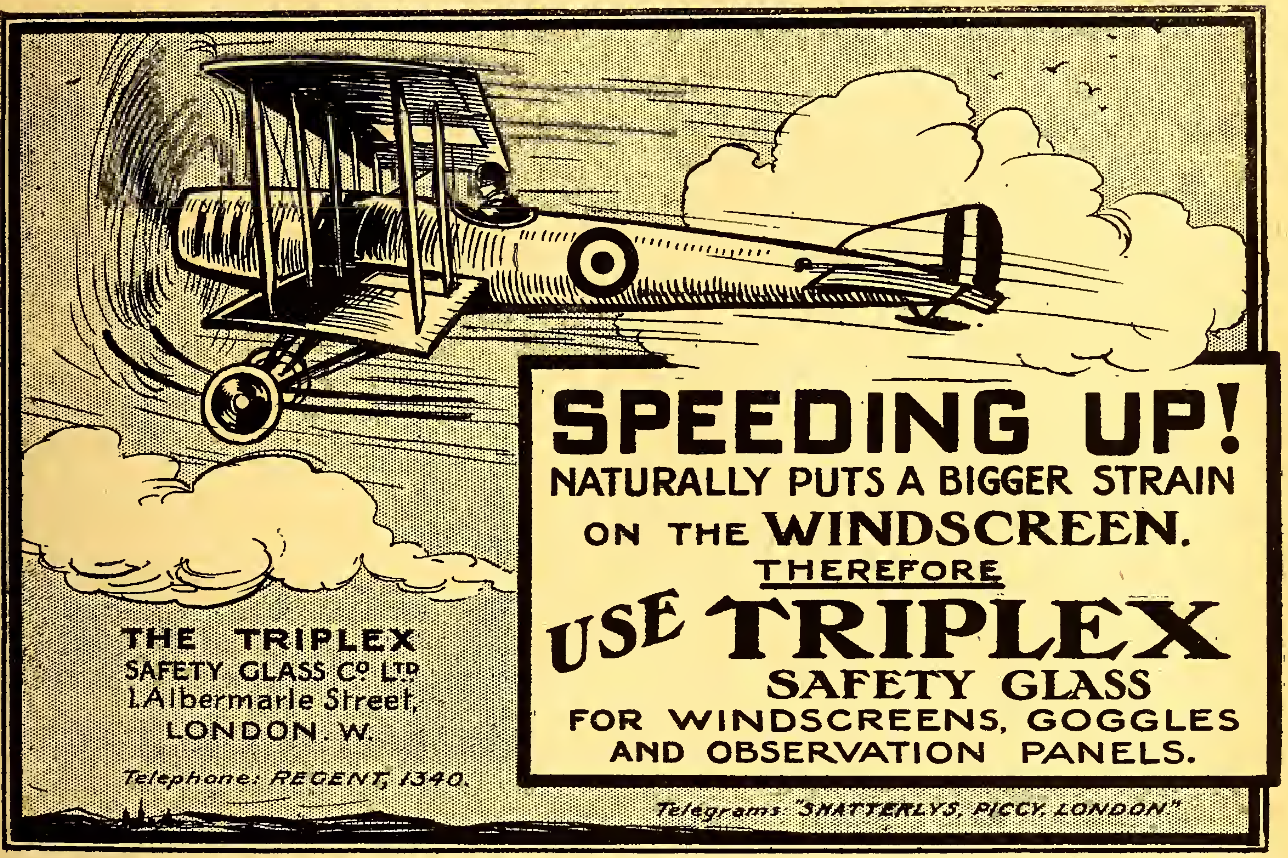

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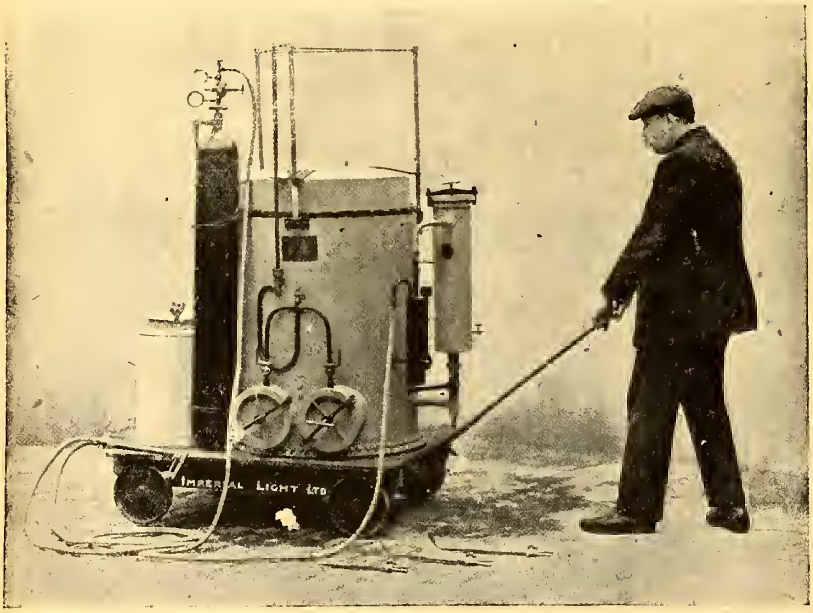

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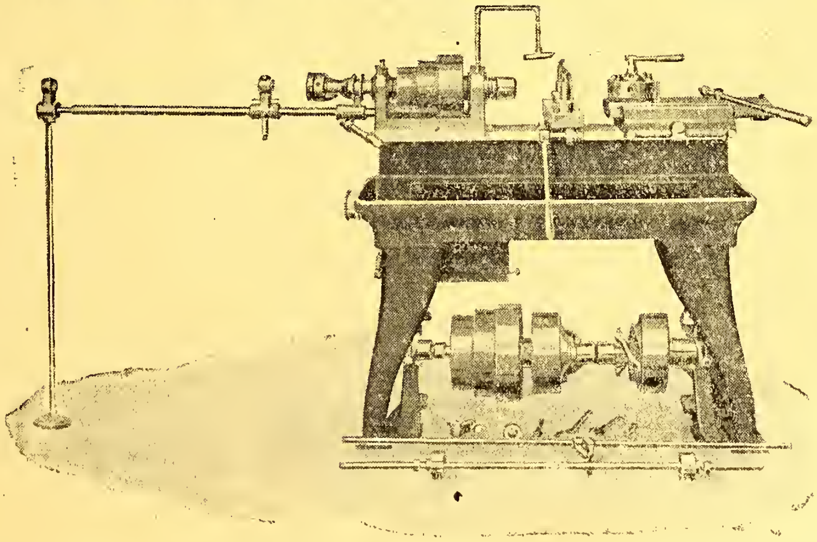

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An Outline of a Course of Instruction for the Training of Aviators.

BY LAWRENCE B. SPERRY.

[Mr. Sperry is concerned with the Sperry Gyroscopic Control for Aircraft, and is himself an experienced pilot.—Ed.]

Much has been said and written in the last two years on the training of aviators, and we of this country (the United States) are vitally interested in the subject, since the recent appropriations have assured the formation of a sizeable air service. An investigation into the present civilian aviation schools reveals the fact that the men are turned out knowing only the rudiments of flying and without being instructed in the finer points that are essential in the making of a capable aviator. Unnecessary risks are taken by pupils in many of the schools, which could easily be avoided if the proper instructions were given.

The following outline of instruction is one that the writer, who has made a study of the matter in the principal aerodromes of Europe since the beginning of the war, considers would render training in flying not only safe to the pupil, but calculated to make him an experienced pilot ready for military work.

First Stage.—The preliminary part of the course may be divided into three parts:—

1. The student pilot should take a few trips as a passenger to accustom himself to air travel and height, as well as to the ordinary manœuvres of the machine.

2. He should fly a dual controlled machine under the guidance of the instructor, in order to learn the control movements. This machine should be equipped with some means of inter-communication so that the pilot may instantly direct the pupil. He should be taught how to get off the ground, by running along the ground until *full* speed is attained before elevating. This point is important for two reasons:

(a) The aeroplane will get off the ground at a lower speed than that at which it will retain buoyancy, because of the "ground bank." This "ground bank" consists of a blanket of air, close to the surface of the earth, of greater density when the machine is passing over it than that encountered at a hundred feet elevation. A machine travelling at a speed capable of sustaining flight a few feet from the ground will go into a "stall" when it rises out of this "bank."

(b) If the machine is elevated from the ground before it obtains full flying speed, the energy of the motor is expended in lifting the machine, instead of going into speed as it does when the machine is allowed to run on the ground a sufficient length of time. It must be remembered that the quickest climb for getting over trees and the like is obtained by allowing the machine full acceleration on the ground.

3. The pupil should then be taught to maintain a straight course, to make proper turns, and to land properly. This instruction in landing is most important, and the following points should be brought out:—

(a) The wheels of the landing chassis and the tail skid should strike the ground simultaneously.

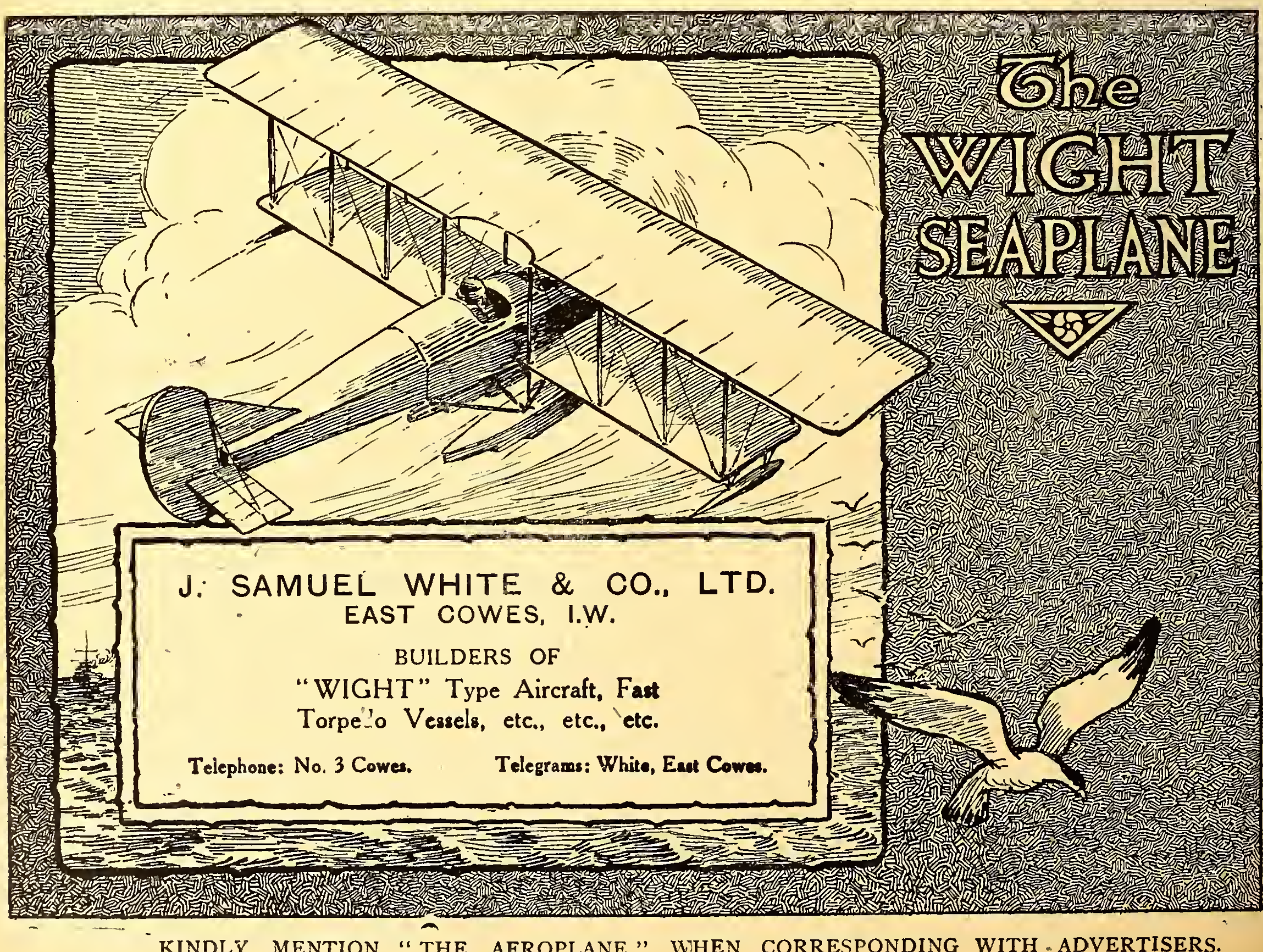
(b) There is a speed at which the maximum lift angle is able only to sustain the plane; this is the critical speed at which the controls should be brought quickly in toward the chest of the pupil in order to increase the angle beyond the maximum lift angle, thereby increasing the resistance of the wings and throwing the greater part of this resistance into drift, which slows the machine down to a minimum.

(c) Such landing is desirable not only because of the reduced speed, which is advantageous when one is landing on rough ground, but also because the tail, on account of being low, throws the centre of gravity far back in relation to the wheels, thereby reducing the possibility of the machine nosing over. This is also very advantageous as a means of protecting the propeller, especially on tractors with small propeller clearance.

(d) The pupil should have at least six hours' training in a dual controlled machine; this time being divided into lessons of not more than fifteen minutes' duration.

Second Stage.—The pupil should fly alone at a large field in a "Penguin," i.e., a machine the wing spread of which is so reduced that it is capable of flying not more than five feet from the ground. This teaches the pupil not only the art of getting the most results from small horse-power, which is of great advantage in case of motor disability in a large machine, but it also teaches him principally what it means to get into a "stall" near the ground.

Third Stage.—The pupil should be allowed to fly alone under ideal air conditions, in a higher powered machine in a large field at least one-half mile wide by one mile long, having been previously instructed simply to make "straightaways" up and down the field, turning the machine around at each end on the ground.



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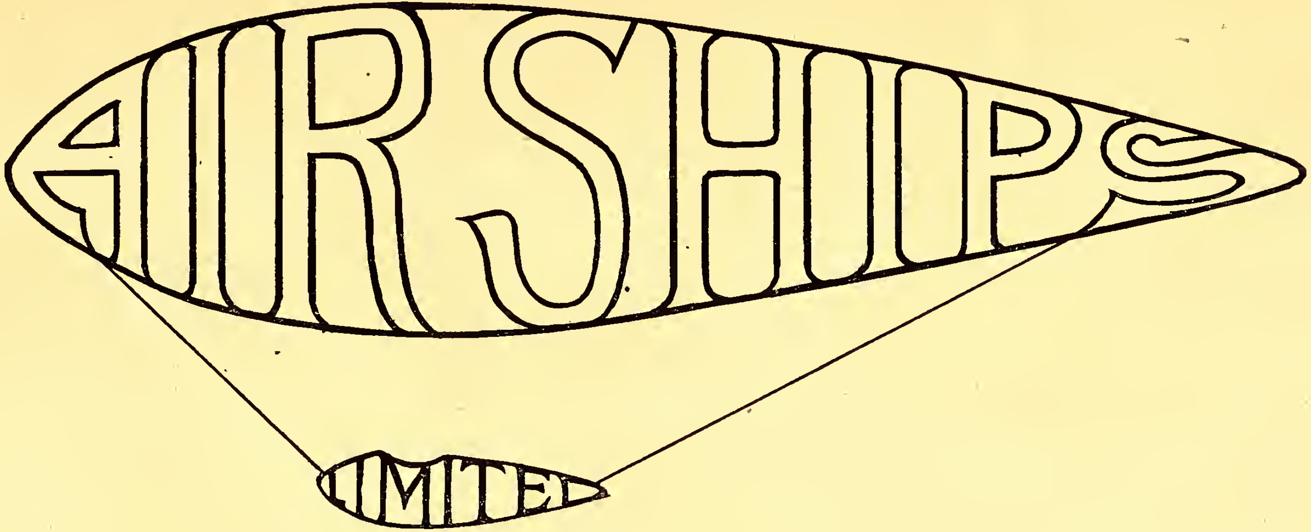

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FOURTH STAGE.—The pupil should be instructed to climb to an altitude of at least 600 feet, and then to make a very slow turn and land in the opposite direction. This is watched by an instructor through a pair of binoculars, to enable him to observe the pupil carefully and to advise him of his mistakes after his return.

At the same time that the air instructor is directing the student's field work, the pupil is learning practical theory, with the aid of a black-board, about subjects such as tail spins and their recovery, spirals, the prevention of stalling, the making of a landing in a small field against the wind, without the necessity of spiralling, by zig-zagging back and forth against the wind, etc. This instruction is incorporated in a complete course of aerodynamics, aeroplane design and construction.

The pupil is now ready for spirals, which should be made at an altitude of not less than 3,000 feet and finished at an altitude of not less than 1,000 feet. The pupil should not make continuous spirals, but should turn first 90 deg. to the right and 90 deg. to the left with the motor shut off; then 180 deg. to the right and 180 deg. to the left; after that 360 deg. each way, gradually working up to three spirals to the right and three to the left, always finishing with an altitude of 1,000 feet.

FIFTH STAGE.—Part of the field, if the field is large, is marked off one-quarter mile by one-quarter mile. The pupil is instructed to fly off the field with the wind in different directions, and on the sounding of a gun to shut his motor instantly and to make the field safely without turning more than 90 deg. In case he finds that he is not within gliding distance of the field, he should be instructed to plug in his motor again and to continue his flight, rather than to take any chances in landing.

SIXTH STAGE.—Landing on a mark is practised.

SEVENTH STAGE.—Each of the requirements of the Junior Military Licence is practised, except the cross-country flights, which are withheld until the course of training is completed.

EIGHTH STAGE.—The pupil flies at 5,000 feet and deliberately "stalls" in the air four times, each time at a steeper angle than the one before until a tail slide is made. These stalls are to be made with the use of an angle of incidence indicator, the pupil carefully watching the indicator and slowly placing his machine at the stalling angle.

NINTH STAGE.—The pupil is instructed to "loop" at an altitude of not less than 5,000 feet, after which he should stall the machine, at the same time throwing his rudder hard over one way, thus putting his machine into a tail spin, if the machine is capable of executing this manœuvre.

To recover from the tail spin is the salient point that the pupil is now to learn. This is effected by throwing his rudder over in the opposite direction, which requires a tremendous pressure on the rudder bar. The writer has found it necessary to exert the force of both feet. The pupil is now ready to take his military licence.

It might be well to remember at this point that "looping," tail sliding, and such alleged "stunting" is only carried on with definite objects in view, namely—

1. To give the pilot confidence.

2. To teach him quick recoveries from unsafe positions, especially near the ground, should he find himself in such positions in the course of carrying out his work as a military aviator.

TENTH STAGE.—After the pupil has secured his military licence, instruction in night flying should be given. This is both one of the most difficult feats of Military Aviation and one of the most important; a great deal of time and attention being given to its development by all of the warring European nations. Night flying should be taught in four stages, as follows:

1. The pupil should fly as a passenger with a competent pilot, thoroughly familiar with night flying.

2. The pupil should fly alone on a moonlight night, or one in which the stars are bright enough to give considerable light.

3. The pupil should begin flying before sundown on a cloudy day, and should continue flying until the sun sets, not landing until total darkness has fallen. No night flying should be undertaken in a machine not equipped with a night flying outfit.

4. The pupil should practise night flying, using his night flying equipment to signal the aerodrome when he intends landing. In case of war, the aerodromes are unlighted, except for a single beam of light, which is thrown vertically; machines also are not illuminated, but, on desiring to land, their pilots flash on their night flying equipments, signalling by pre-arranged code to the aerodrome, whereupon the grounds are illuminated for landing. The pupil should be cautioned against inadvertently getting into fog. There are foggy days when, although it is not possible to see more than 600 feet straight ahead, it is frequently practicable to fly. These days can be gauged by looking straight upward at the sky. If the azure blue can be seen, the fog is limited to a blanket that does not extend over 500 or 600 feet above the ground. While the pupil is climbing in this fog, he can see nothing but fog surrounding him. When he has climbed just above the fog, he can see beneath it, and as he climbs higher and higher, he begins to be able to see around him. This is due to the fact that it is only possible for him to see through

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the blanket of fog at an obtuse angle, when a large area of the ground becomes visible from an elevation of some 2,000 feet.

Flying in fog is very similar to night flying, as it requires a finely developed sense of equilibrium. In both night flying and flying in fog it is extremely advantageous to use a machine equipped with an automatic pilot.

During the latter part of the tenth stage, the pupil should be allowed to carry an observer as passenger, so as to familiarise himself with the various manœuvres that are necessary in order that he may obtain such information as he requires. This needs a system of co-operation and some means of communication between the pilot and observer.

Coming into a small field against the wind the pilot pupil should either zig-zag or reduce his altitude to 200 or 300 feet, by going abeam or at right angles to the wind. This prevents him from getting into the predicament of going short of his mark.

It should be remembered that in learning to turn, if the pupil attempts to make his turns sharp or short at first, no matter how much he practises he will never learn how to accomplish a perfect turn. The only way he can expect to learn to turn satisfactorily is first to make the turns very big, watching all the time his revolutions, and his air drift indicator, and also his angle of incidence indicator, if he has one, being sure all the time to keep his relations at all parts of the turn exactly right. Otherwise if he tries to do short turns he will think he is doing correctly when he is really on the brink of dangerous positions.

The pupil should be watched at all times through glasses and made to repeat any faulty manœuvre until he does it perfectly.

Any tendency toward over-confidence and carelessness in landing should be followed by a suspension of three days to one week.

AVIATION IN MEXICO.

By GUY GILPATRIC.

At this time, with our troops fresh from the Border, it is interesting to know what Barbarous Mexico has done in that most modern of sciences, Aviation. It will surprise many people to learn that the Mexicans were the first in the world to appreciate the value of and to employ an aeroplane in actual warfare.

Mexico's first war aviator, and hence the first in the world, was an American, the late Captain Hector Worden. Worden was well known through his exhibition flights in the Southwest, and was a skilful pilot. In 1911 he was engaged by the Mexican Constitutional Government to do bomb-dropping, scouting, and the rest of it. Aeroplanes were not as dependable then as they are now, and Worden was given a salary of $1,500 per month (American money) and commissioned captain in Madero's forces. At that time the principal activities of the rebels were tearing up railroads and dynamiting bridges, so Worden's job was to patrol the lines, via air, to report the damages thus discovered, and, incidentally, to drop bombs on any enterprising persons whom he might surprise at their destructive work. Worden did his duty well, and materially decreased the difficulties which had made railroad travel through hostile country almost impossible. Occasionally bullets would go zipping through the fabric on the wings, but the pilot was never wounded. After many months of this work Worden voluntarily resigned his commission and returned to his former occupation of exhibition flying. While exhibiting at a county fair in Texas he was seized with heart failure when 2,000 feet in the air, and died before he reached the ground. Although his machine was badly smashed, all its controls were intact, and medical evidence showed that his death was not the result of the fall.

Encouraged by Worden's success, in 1912 the Mexican Government sent three army officers to the aviation field at Mineola, Long Island, to learn to fly. These young men—Alberto and Gustavo Salinas, and Ignacio Ruiz—rapidly developed into brilliant aviators. The Salinas boys, nephews of General Carranza, at present hold responsible positions under the Carranza Government. One is Chief of Artillery, and the other is Chief of Aviation. Both have given up their actual flying, but their experience and knowledge have proved invaluable.

The next aviator to go to Mexico was Didier-Masson, a Frenchman who had adopted the United States as his home. He took his crated machine from Los Angeles to Tucson, Arizona, and managed to smuggle it across the border. The Federal authorities made quite a stir over this, as Didier-Masson's machine was unquestionably intended for the rebel faction. As the writer was one of a number of aviators in Los Angeles at the time, he came in for his share of the interrogations conducted by the authorities. Of course no one knew anything, and inquiries were dropped. Meantime, Didier-Masson was doing good work for his employers by his scouting and bomb-dropping. A persistent rumour that he had been shot down and tortured to death held credence for some months until it was finally dispelled by the aviator himself. He is now serving with the American Escadrille, fighting for the French in Flanders.

The late Charles F. Niles then interested himself in Mexi-

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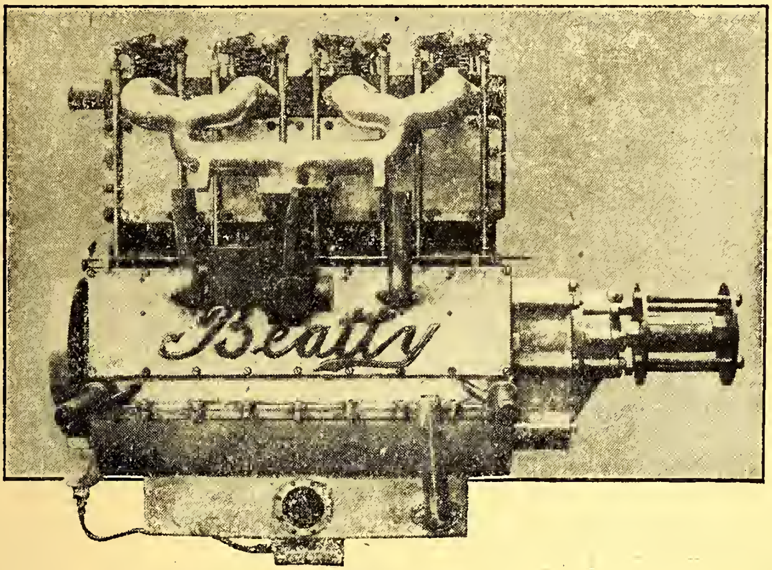

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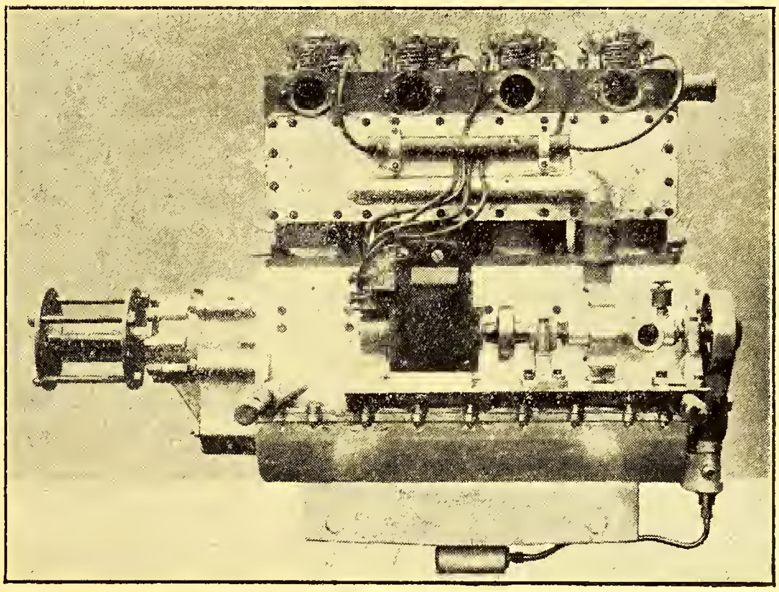

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can affairs. Niles was famous as a trick flier, and his work marked him one of the most eccentric and reckless men in the game. When Niles went to Mexico the Carranza regime was just dawning, and he worked in conjunction with a fairly well organised army. After several narrow escapes from death through forced landings in the dense undergrowth, and also because exhibition flying appealed to him more strongly than being shot at, he returned to the States. Shortly after he performed marvellous feats at the Panama-Pacific Exposition, following that with a very successful tour of Japan. He was killed at Oshkosh, Wisconsin, last spring, while looping the loop.

Upon Niles' return from Mexico, the writer was approached by the Carranzista agent in New York, and tendered the position of Chief of the Mexican Aviation Corps, but being already under contract the offer was declined, and W. Leonard Bonney took the post. By this time the Aviation Corps consisted of five machines and a motley assortment of men to fly them, Bonney and a youngster, Lawrence Brown, being the only Americans. Another of the pilots, Puflea, was an Austrian, the rest Mexicans. Bonney and Brown did much useful work—the former once blowing up a troop-train with a dynamite bomb. They both had many close calls, but returned safely to the States at the expiration of their engagement.

Meanwhile, characteristically quick to realise the importance of the aeroplane as demonstrated to his discomfiture by Carranza, General Villa decided that an air force was his greatest single need. With this in mind, he arranged for the purchase of half a dozen machines, and hired aviators to fly them.

The Villista Aviation Corps wrote for American aviation one of its most tragic pages of her history. Of the six men who crossed the fatal International Bridge at El Paso only four lived to see it again.

General Villa claims that he was hopelessly swindled when he bought the machines, and from the evidence of those who saw these worn-out and rickety remains of aeroplanes it would seem that such had been the case. At any rate, Aviators Mayes, Fish, Rhinehart, McGuire, Heth, and Bergenthal, all Americans, went southward to their hazardous task. They found all the machines in bad shape and in every way unsuited to the work. Mayes was killed through colliding with the side of an adobe house; the details of McGuire's death have never reached the writer. Bergenthal got away as soon as he could. Farnum Fish was seriously wounded and sent back to El Paso. His escape from death was terribly close, as he was wounded while in the air, and his glide to earth was made while nearly unconscious from loss of blood. Heth decided to leave at short notice, but was arrested and sentenced to be shot. As his guards were Mexicans, however, he experienced but little difficulty in bribing them to let him go. He was 200 miles from the Border, but somehow he managed to make the trip, and the walks under the broiling sun, the stolen rides on belated freight trains while all the time a hue and cry was raised for his scalp, mark Heth as something of a hero. Rhinehart made up his mind to follow Heth, and one day, while on scouting patrol, he flew his machine northward till his gasoline gave out, when he landed and walked the rest of the way.

Then Villa bought a really modern machine, and with this Aviator William Lamkey did some useful flying. His enthusiasm quickly waned also, and he was permitted to return to the States—the only aviator in the Villa employ actually to collect the money due him.

At the present time Carranza's air forces are somewhat small, and practically nothing is known about Villa's aeronautic activities. But the history of Mexican aviation, when it is written, will disclose stories of American heroism that will make wonderful reading. Such tales will be of daring—of magnificent adventure—of death. The biographies of the old-time soldiers of fortune will be tame compared to those of a dozen American boys hardly out of their 'teens.

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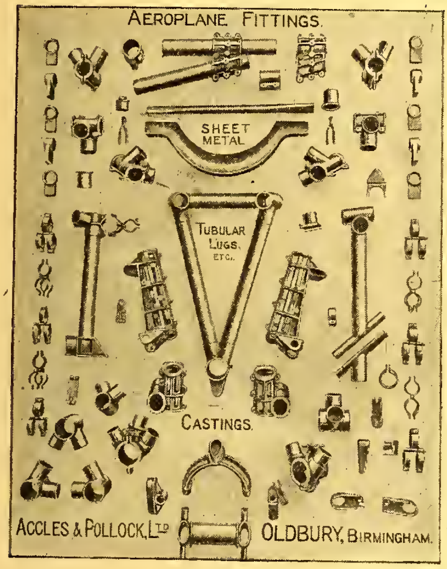

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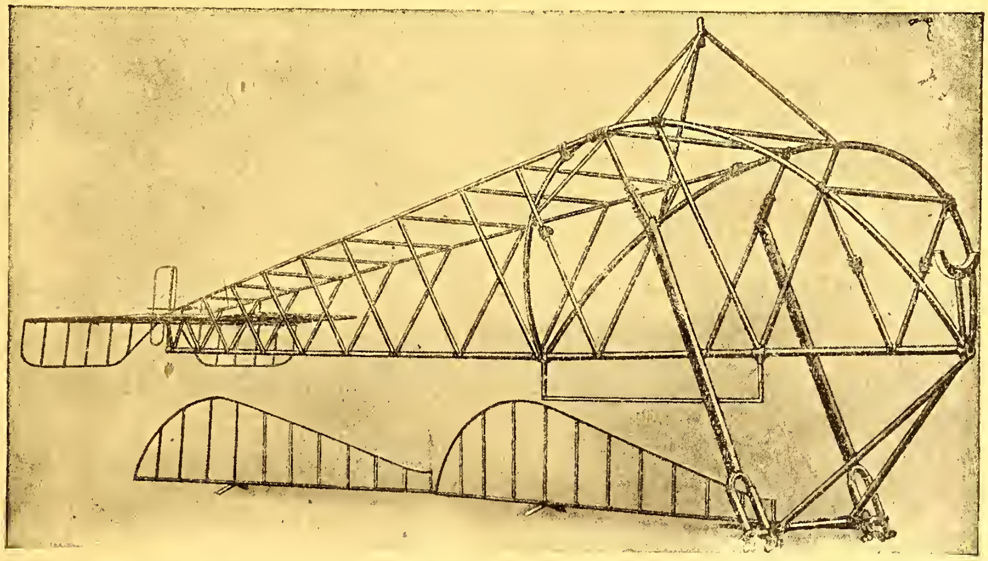

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THE STERLING-SUNBEAM AERO ENGINES.

The following notes are taken from the "Aerial Age Weekly," of Nov. 27th, 1916; as also is the illustration:—

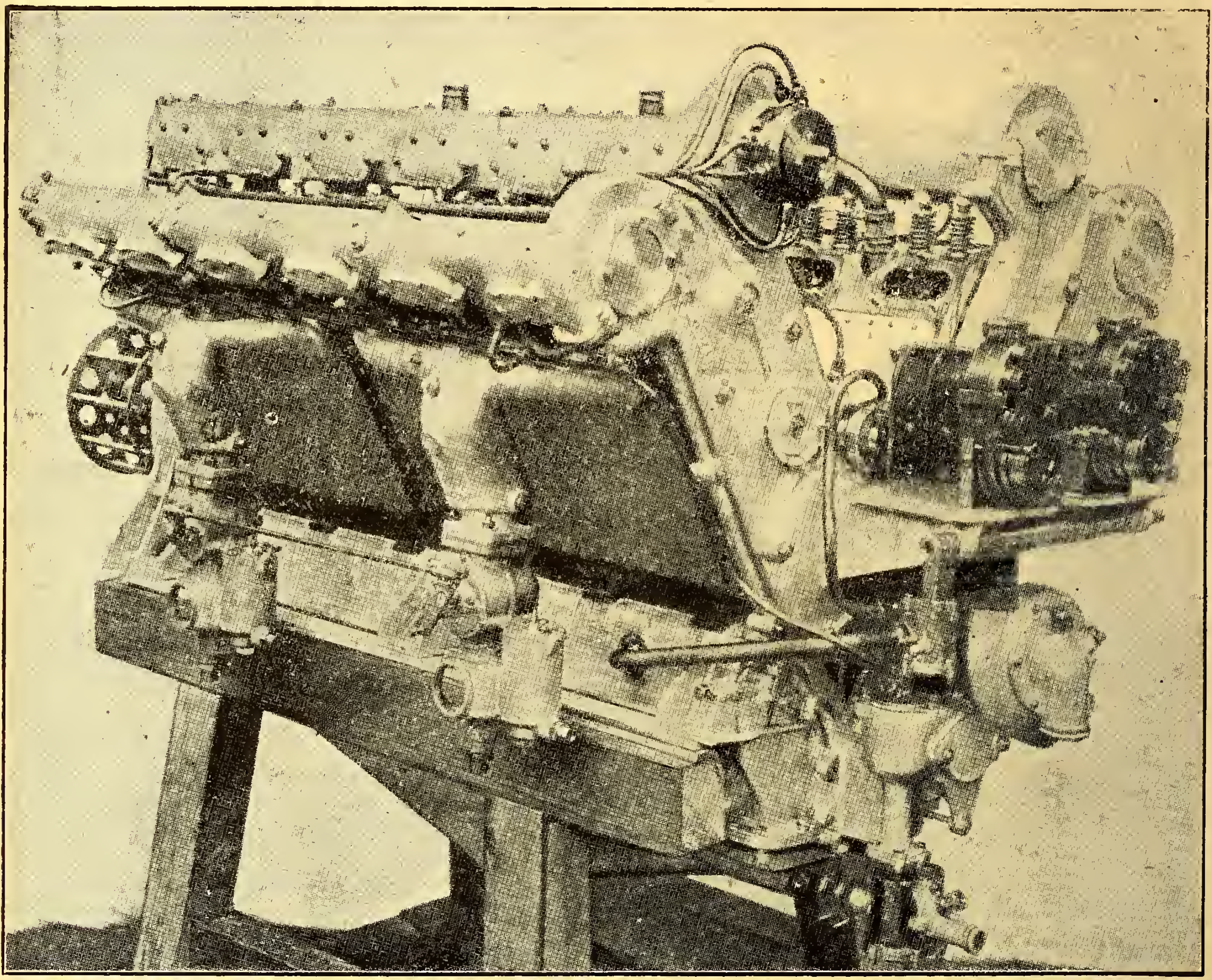
The Sterling Engine Company, of Buffalo, N.Y., builders of high grade gasoline marine motors, have acquired the American rights and licence for manufacturing Sunbeam-Coatalen aero-motors, and it will be known in this country as the "Sterling-Sunbeam."

The motor will be built under the plans and formulæ and direction of the Sunbeam Motor Car Company, of Wolverhampton, England, and the motors as built by the Sterling will be built to duplicate. Among the motors that will first be produced will be the 8-cylinder, 150 h.p.; 12-cylinder, 220 h.p., and the 12-cylinder, 320 h.p., but the first motor to be built will be the 320 h.p., 12-cylinder.

The Sterling Engine Company expects to have this 320 h.p. motor under test in three months, as the work is progressing very rapidly on this particular motor. It will be the policy of the Sterling Engine Company not to put this motor out on to the market until it has produced its first two or three motors for test.

This same motor has passed the English Admiralty test, and recently passed a very successful test for the French Government, at Chalais Meudon, near Paris. The weight of the 320 h.p. motor is 1,000 lbs.

The reputation of the Sterling Engine Company is well established, and it is one of the oldest manufacturers in the building of



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high grade gasoline motors; building powers from 10 to 300 horsepower. They have been brought very promptly into public notice in the marine field, on the production of their Model-F marine motor. A great many of them have been used, and have taken an active part in scout and patrol boats about England, Italy, and Russia. The motor used most extensively for this service is the 8-cylinder, 5½ by 6¾, developing 200 h.p. at 1,400 r.p.m.

The Sterling Engine Company also has the distinction of powering boats that have won the Classic Gold Challenge Cup for the last six consecutive years, and holds world's fastest speed record, so the producing of Sunbeam motors should be in very good hands when fostered by a company of such wide experience as the Sterling Engine Company.

Following is a brief description of the British Sunbeam-Coatalen as designed by Mr. Louis Coatalen, which in general characteristics is to be reproduced in the new American "Sterling" Sunbeam.

Fixed "V" type cylinders are disposed in *en bloc* castings in four sets of three at 60 degrees on the crank chamber. They are made from a special grade of cast iron, enabling the water-jackets to be cast extremely thin, at the same time maintaining strength.

Valves are on the inside of each row of cylinders, and are actuated by a single cam-shaft which is housed in the top of the crank-case, between the two sets of cylinders, and lubricated by oil fed from the main duct.

The crank-shaft is carried by bearings, between each throw, of large diameter.

Connecting-rods are arranged so that the big ends are side by side on each crank throw. The opposed cylinders are staggered in relation to each other to allow this. The water circulation is by a gear-driven centrifugal pump.

Two magnetos are fitted, each operating six cylinders.

Lubrication is forced by a gear-driven pump, which is fed direct from an oil tank separate from the engine. This forces the oil to the main bearings, and from thence it passes through the hollow crank-shaft to the big end bearings. From these bearings it is splashed to lubricate the cylinder walls, after which it runs to the pump through a filter of large dimensions, and is returned by a secondary pump to the oil tanks, so that it is not exposed to the heat generated in the crank-case for any length of time. It thus retains its lubricating properties, enabling the oil to be used over and over again.

The engine is fitted with a reduction gear of 2-1, enabling a large propeller to be used at a slow rate of revolution with great efficiency; at the same time a very even torque is imparted by the engine to the propeller.

The reduction shaft is specially mounted on ball-bearings, and is provided with a special design of thrust-bearing, thus allowing the engine to be used for either a tractor or a propelled type of machine without alteration to the design.

Specifications.

Bore and stroke: 90 mm. by 150 mm.

Crank-case: Special strong aluminium alloy.

Self-starter: Special air distributor fitted with valves and pipes, complete, ready for coupling up to a compressed-air bottle.

Ignition: 2 high-tension, 6-cylinder magnetos.

Carburettors: 4 C. Z. 40 mm.-type Claudel Hobson.

Revolutions: Normal revolutions of the engine 2,000 r.p.m. giving a propeller speed of 1,000 r.p.m.

Fuel consumption: The consumption of gasoline is about .58 of a pint per hour, and the consumption of oil is about ¾ gallon per hour.

THE PAN-AMERICAN AERONAUTIC EXPOSITION.

An important aeronautical exhibition is to be held from Feb. 8th to Feb. 15th in New York, under the auspices of the Aero Club of America. The exhibition is to be held in the Grand Central Palace.

The object of the promoters is to create a wider public interest in the future of flying for purposes of commerce, and to emphasise the need for a vastly augmented national Air Service for defence purposes.

The leading American aeroplane constructors will exhibit their latest machines, and two of the chief attractions will be the original Wright aeroplane and an Army kite-balloon, which will be inflated with air and suspended in the centre of the hall.

The exhibition will be attended by delegates from all the States of America, and the Republics of South America will be represented. M. Alberto Santos-Dumont is expected to take a prominent part on behalf of South America.

The opportunity will be taken to boom the National Aeroplane Fund, an institution which has attained important proportions, but of which even more is expected in the future. There is no doubt that the patriotic funds in France and Germany did much to assist the progress of aviation in those countries, and, therefore, a repetition of the experiment in the U.S.A. seems warrantable.

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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

FURTHER COOLING POSSIBILITIES.

That absolutely even and, furthermore, somewhat restricted distribution of the cooling air under forced draught, is the big true story of the Kemp motor. Indeed, the close fit of the air-shrouds makes it more of an air-jacketing than anything else. None of the other air-cooled aeromotors can claim to be more than air-tented, when they are completely covered in, as designed.

And obviously, so long as they are air-tented, they lose half their radiation: which—as will be seen in the first and last illustrations—is absolutely unrestricted in the case of the Kemp, through the shroud-openings. Indeed, the excess heat is positively blown off by the air stream. The only improvement one can suggest is that the air-shrouds should be louvred inwardly of the V, instead of "fenestrated," as at present, so as to get the utmost effect of the close-shrouding.

At any rate, nothing so effective in the way of air cooling has been seen since that conversion of a water-cooled motor—by freely drilling the jackets and coating the cylinder walls with a mixture of silica and rock-salt—that was introduced some years ago by Markham and Prance. In that case, I understand that the patent, if any, lay in the rock-salt part of the scheme; for the perforated-jacket conversion had already been exhibited three years or so earlier, by some experimental Frenchman in the Serros de la Ville annexe of the Salon de l'Automobile; where alone such outcasts as did not belong to the *grande commerce* of the motor-car trade were allowed to disport their ideas. There, or in the remoter galleries. So thither one usually went, to look for brains and originality. It was nearer, anyway, than Islington, where we always quarantined anybody so suspected.

AS TO RESEARCH.

Whether a similar salt-glaze would add to the artistic merit or physical efficiency of the Kemp air-cooled motor or its future British analogue, I cannot say. I do not know, either, what particular metal the air-shrouds happen to be made of. Only what they might be, and in all probability are not.

If they were, their efficiency would be superlative. Which cryptic statement means to convey this hint, in plain English, that the finest research laboratory the British aeromotor industry could have now, or for the next five years to come, is the library of the British Patent Office; the tomb of dead inventions, done to death by the condemnation of alleged "consultant" experts; the be-lettered charlatans of text-book and slide-rule.

THE KEMP INDUCTION.

Still, the air-cooling system is by no means the only feature of merit in the Kemp design. The position of the induction omnibus-tubes on the inside of the V, and the exhausts on the outside is, of course, unexceptionable; and is at least stereotyped by this time as the best practice. But—the overhead view and the end view show respectively that the induction stops at the end cylinders, and that there are two carburettors wholly unconnected except as to the linking of the throttles.

This would be all very well in a vertical "four" or "six," air or water cooled; passable, though none too efficient in a water cooled V-type eight cylinder model. But in my humble opinion, very bad indeed in an air-cooled eight, be it a Renault, Kemp or any other. Bad, because distinctly neglectful of long-known better practice with well-assured results, and worse in an air-cooled motor. For such a motor, as has already been shown, repels its induction and thins the mixture because of its direct cylinder head-radiation.

That means a certain economy, admittedly. But beyond a certain degree—which is soon reached in the higher atmospheric densities of high altitudes—it may well come to mean starvation and wire-drawing. You cannot get the power out, if you do not put sufficient of its making in. Make the most of the mixture, by all means: gasify every drop of the petrol—the motor, as an air-cooled one, assists this result for you in any case—but you must keep a rap-full volume of mixture—a head of power, so to say—always on hand.

SOME REASONS WHY.

Therefore the Kemp, or any other like proposition, present or to be, needs above all things a circulatory hoop-like induction; the endless "shore-haul" of more than one other American aeromotor design, which also was the chief feature of the original Wolseley. Nothing could have been easier, too, in the case of the Kemp, than to have fitted such a hoop-manifold; which, always filled with mixture at a regular pressure and velocity, slowing or increasing regularly and evenly without bumping or hunting under any throttle variation, would have added a

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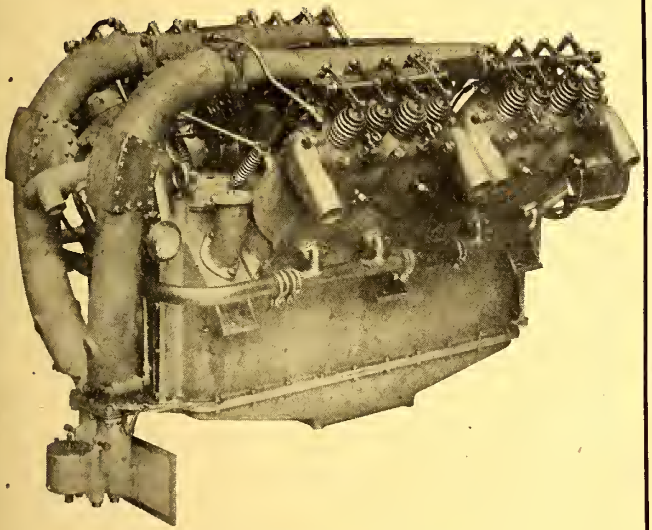

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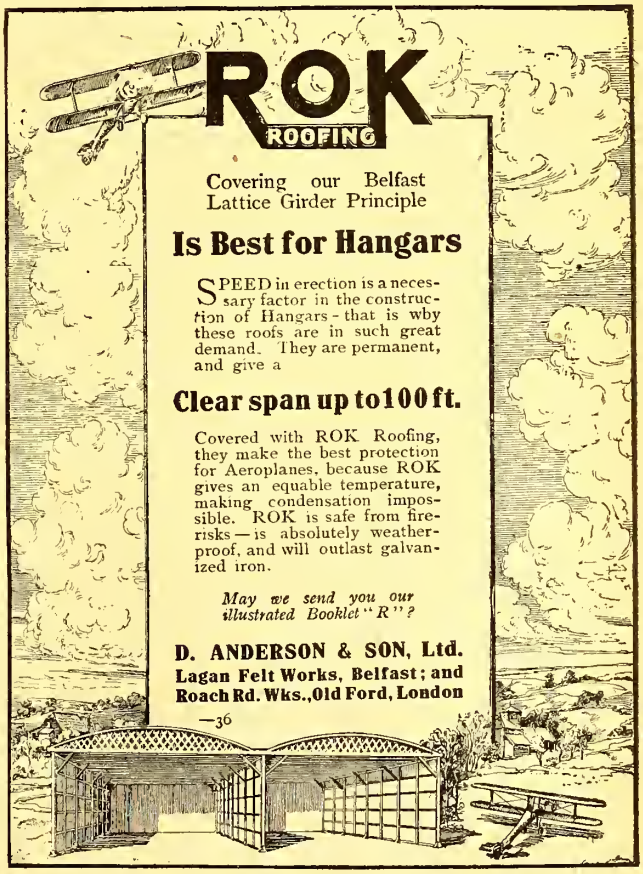

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good fifteen per cent. to the power output, and not increased the average consumption at all.

I dwell on this point, not only for the reason already given that I believe the air-cooled type to have the greater future for overseas aviation, and for general purposes, but because I am anxious that the utmost should be made of its possibilities in future designs. Which up to the present—as witness these examples—has not been the case.

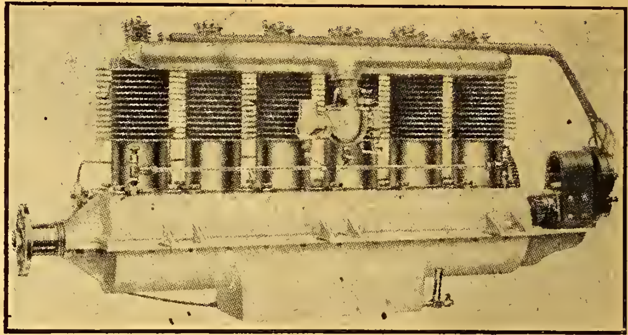
The matter of the carburettor is, of course, like the foolish riddle, how many shells would sink a dreadnought?—the answer in this case being one, if big enough. Yet two, one at each end of the hoop, are better. The hoop itself is sufficient connection to steady and equalise the jet-stream or spray from each; and no matter what happens, whether the aeroplane climbs on end or dives headlong, or whether a grain of grit chokes one jet—not at all an improbability when flying over drought-stricken or sandy country—the other jet will always be feeding out petrol and enabling the motor to carry on.

But with two, set on in the manner of the Kemp, anything may upset the carburation; and set one side of the V straining, while the other side is suddenly slackened up. Those two air-openings facing each other, are *not* for fitting an equalising tube, in the fashion of the Green motor, as might be supposed; they are air-inlets solely.

As to Cylinder Design.

The cylinder-head design of the Kemp V J-8, as well as the H6, lends itself to possibilities—easy ones—that have been wholly neglected. Which also, for industrial reasons, it seems well to point out. These heads are flat-topped. Just as well could they have been slightly minaretted at the very top—doing without the top-most flange—which would merely have brought the edges of the cylinder tops into close relation without touching, or requiring the cylinders to be set any farther apart.

This would have given a larger valve-area and a smaller lift—an almost supreme consideration for the exhaust-valves of an air-cooled motor—no matter whether they were set in line, as shown in the present design, or diagonally staggered across the top, so as to enable the valve-gear still to operate from the inside of the V.



A specimen of the Smaller Kemp Motor.

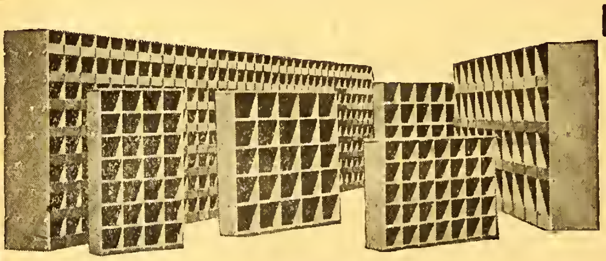
There would also have been plenty of space left for several very useful radiator-flanges. And most important of all, not only could the tubular exhaust passages—which also comprise the valve-seatings and housings—have been liberally finned—as in the R.E.P., Farcot, Renault, and Beardmore designs—but both exhausts and inlets could easily have been cast as separate pieces so as to form detachable valve-housings, held in place with the usual castellated grip-rings.

This would have cost more, of course. But in an aero-motor design, especially, one must spend money, not only where it shows as a talking point, but also where the detail in question happens to be a positive essential of requisite accessibility and functional efficiency. Or at a pinch, these pieces might have simply screwed into the head, gas-stove style, no less effectively.

As it is in the Kemp design, the cylinders must actually come down, whenever those "rich tungsten" valves need grinding. Which of course they do, to seat true in the first place, and secondly, once after every two thousand miles flying at least, as belonging to an air-cooled motor with direct radiation, and no special provision for valve-cooling round the seats or anywhere else.

The Ancient Valve Question.

According to book and assumed belief, valves never warp nor do valve-heads ever break. It is only when they get a few thousand feet aloft that they acquire this vicious habit. Which constitutes another pressing reason for the detachable valve housing, because then nothing is easier than to form a little circular flange in the cylinder head opening just below the valve-seating. It need be only a sixteenth of an inch wide, but it is sufficient to catch a broken valve head. With which precaution duly provided, it does not much matter whether or not the valve-



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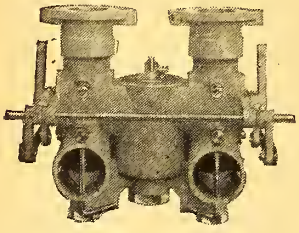

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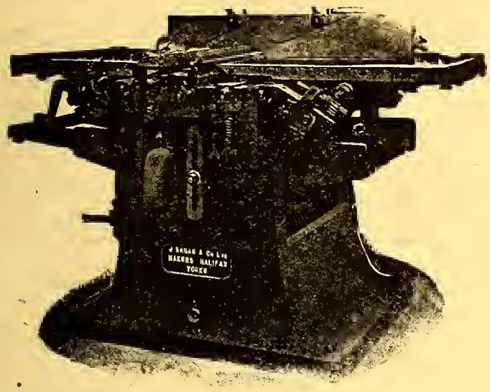

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spring cup is locked so as to prevent the valve dropping: as is claimed in this case.

On the other hand, the statement that because the springs—in this case plain spirals—are mounted above the housings, their "tension" is not affected by the cylinder heat, is obviously untrue. They happen to be compression springs; and unless they were seated on mica or fibre discs the heat could not fail to reach and affect them. If rat-trap coil springs of the Salmson or Curtiss type had been fitted, or each pair of valves had shared a leaf-spring on a pillar-stud between them, the claim might have stood. But we have to deal with actualities, if only to see better how to avoid their errors.

Concerning Colonette Attachment.

Incidentally, it would not have spoilt the Kemp air-cooling scheme, nor indeed affected the closest fitting of the air shrouds of any such motor, for the cylinders to have been attached to the crank-chamber by colonette bolts. For those the essential overhead spider—practical designers do *not* make the R.A.F. mistake of casting lugs on an air-cooled motor that stress off under heat—could have been dropped over that central pillar-stud suggested in the last paragraph.

Such colonettes are kinder to any aluminium alloy of which a crank-chamber may be made than the usual foot-bolts, stress the metal less, and make an altogether more rigid construction, despite the ready detachability they afford. They represent, in fact, a bit of the motor-cycle practice that should always influence the general design of an air-cooled aero-motor.

On the other hand, flange-gripping, in the Gnome fashion bayonet-joint insertions, and still more screwing in, are only successful with a steel crank-chamber. At any rate, no aluminium alloy will stand for the last-named method of attachment, as the threads cut and strain all to rags.

Even colonette-bolts are all the better for being rooted in a steel or bronze housing round the crank-journal bearings, which again, costs perhaps a little more in the construction. But so little more—for these housings need only be castings, and only be machined for the bearings—that the extra cost is negligible in view of the sounder result. And literally. one cannot exaggerate soundness, internal and external, in every detail of an aero-motor.

The Kemp Cylinders.

Turning, however, to actual detail, the Kemp cylinder construction leaves nothing to be desired. How far successful—as an advance in motor-material—the American "semi-steel" idea of a mixture of some two-thirds grey iron and one-third low carbon steel may be, I do not know. The chances are that it is sound, or it would hardly have been so universally adopted. Such, at any rate, is the material of the Kemp: the claim being that the metalic proportions give extra strength, just short of affecting efficient lubrication under heat. But the construction is right, the cooling fins being machined out of the solid casting, thus leaving an open skin on the metal, getting the true heat-dispersion curves, and also getting rid of the hard scale almost invariably found on cast fins.

Unlike the majority, the Kemp people have not run incontinent after aluminium alloys for their pistons, but have taken whatever advantage there may be in "semi-steel" for their pistons. These are consequently enabled to be machined out into very light but strong shells, well-ribbed internally in the original casting.

They carry only two rings each: these being of the Wasson make, which is of the same thickness all round, and so tempered that the tensility and compressibility are uniform all round, irrespective of the wear on the outer surfaces. Consequently, not only does a very close fit become possible for the pistons, but the rings only need 0.005 inside clearance: thus incidentally preventing carbon deposits as well as gas leakages

(*To be continued.*)

A NEW YEAR'S GIFT.

Cellon, Ltd., the well-known aeroplane dope manufacturers of Broad Street House, E.C., have for some years past made it a practice to send to their customers a New Year's souvenir in the form of some useful office fitment.

This year the presentation takes the form of a loose-leaf calendar and memo. tablet mounted on an oak board for desk use. A separate sheet is devoted to every day of the year, and the leaves can be turned over from day to day or torn off, as preferred. A sign of the times appears in the calendar, where the days of the week and the month are shown in French, Italian, and Spanish, as well as in English—but not in German.

Altogether the fitment is quite a success, and should do good service in keeping the firm's name before aircraft constructors.

SHELL PATRIOTISM.

On Dec. 23rd the staff of the Far Eastern depots of the Asiatic Petroleum Co., Ltd., presented the British Red Cross Society with a Buick motor ambulance, which, after the presentation, at once took up active duties for the Red Cross. The ambulance was presented by Mr. J. Y. Kennedy, the secretary of the Associated Companies representing the "Shell" Royal-Dutch in-

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terests, and amongst those present were Mr. M. S. Abrahams, of the Anglo-Saxon Petroleum Company, Mr. Adolph de Jongh, of the Asiatic Petroleum Company, and Mr. G. Phipps, of the Anglo-Saxon Petroleum Company.

The ambulance, which is equipped in a most up-to-date manner, is capable of carrying four wounded soldiers, and will no doubt be an acquisition to the British Red Cross, on whose behalf it was received by Mr. Box.

A CHRISTMAS FESTIVITY.

The inaugural dinner of the Davidson Aviation Co., Ltd., was held at the Clarendon Restaurant, Hammersmith Broadway, on Dec. 21st. The dinner was given by the firm to the staff and employees, and a very representative gathering of about 200 assembled, including practically all the staff, a number of visitors, and delegates from the different departments of the works, including a number of women workers.

The menu was prepared with great skill to provide the maximum fare under the new eating and drinking regulations, and everyone did justice to the providers of the entertainment.

The honours of the chair were shared by Mr. W. E. Chester, the managing director of the firm, and Mr. P. L. Mott, a well-known City man who has just joined the board as chairman of the company. Among the guests was the Mayor of Hammersmith.

Mr. Chester, in proposing the health of the guests, spoke with warrantable pride upon the growth of the firm during its short life of six months, starting as it did with only twenty hands, from which it has increased to several hundreds. Mr. Chester took this opportunity of formally introducing Mr. Mott to the firm generally. The manner in which Mr. Chester's speech was received makes any doubt as to his popularity with all hands impossible.

The dinner was followed by a concert with a varied and original programme, one or two of the items being absolutely extempore. The most popular turns were those which permitted of a chorus being sung, and a humorous ragtime violin recital by Mr. Gerrard of the Hammersmith Palace evoked considerable emotion at the bottom end of the tables—in fact the spirit of volution was so strongly upon the land that two buxom young women could not refrain from entertaining the company with a short exhibition of ragtime as danced by experts. One of the best songs of the evening, "Friend o' Mine," was sung by Miss Marion H. Lancaster, daughter of the secretary of the company.

As is not unusual with Works festivities, a few of the employees became a trifle over-exuberant during the entertainment, but their friends put up with them good-naturedly, and there is no doubt that everyone thoroughly enjoyed himself, or herself, according to his or her particular kind.

One looks forward to an even more successful dinner next year.

ANOTHER CHRISTMAS FESTIVITY.

The directors of the Blackburn Aeroplane and Motor Co., Ltd., entertained their Leeds and Hull staffs to a dinner and concert at the Hotel Metropole, Leeds, on Wednesday, Dec. 20th. Covers were laid for about 200 guests, and the function was eloquent of the good relations prevailing between the firm and employees. After a well-served repast, Mr. Blackburn, the managing director, proposed 'The King," and the chairman of the Company, Mr. Stuart Hirst, proposed "His Majesty's Forces."

In a speech sketching the new and valuable services rendered by aircraft in this war, he referred specifically to the splendid achievements of aircraft built by the firm, and referred to certain records obtained by their seaplanes, which was a tribute to the designing ability of Mr. Blackburn as well as to the splendid workmanship and finish which has become characteristic of Olympia. Mr. Hirst, in conclusion, paid a tribute to the services of the R.N.A.S. and the R.F.C.

Lieut. J. Reed, R.N.V.R., the chief Resident Naval Inspector, suitably replied, after which Mr. G. Chapman proposed "The Firm."

Mr. Blackburn next replied to this toast, and expressed his thanks to the staff, as well as to the workpeople, for their loyal co-operation, without which it would have been impossible to have built up the business at Leeds and Hull to its present point of high efficiency. This entertainment was the only means left for the directors to show their appreciation of the labour unselfishly put in and the long hours unselfishly given by the staff and by the workpeople in order to ensure an output of work sufficient to satisfy the Admiralty and War Office.

Among other toasts honoured were "Our Allies," proposed by Mr. J. E. Jackson (director), and responded to by M. Libois; and "Our Chief Pilot," given by Chief A.I.D. Inspector Birley, and acknowledged in a witty and practical speech by Mr. W. Rowland Ding.

Among those contributing to the musical portion of the programme were Misses Blackburn, Tindale, and Bradley, and Messrs. Chapman, Hick, Fountaine, B. Hill, P. W. Hardcastle, W. G. Griffiths, F. Wilkinson, and Millington. The Olympia Orchestra, which was some time ago recruited from the employees, and is a very efficient combination, was responsible for the musical numbers during the course of the dinner.

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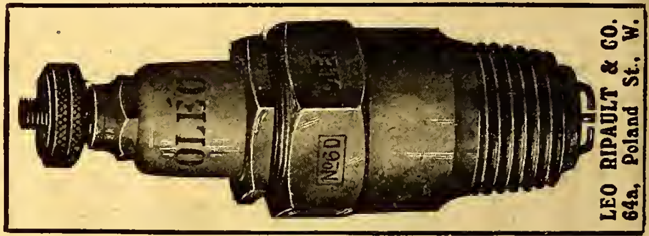

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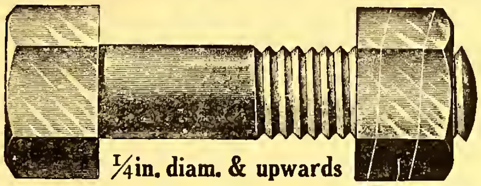

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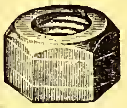

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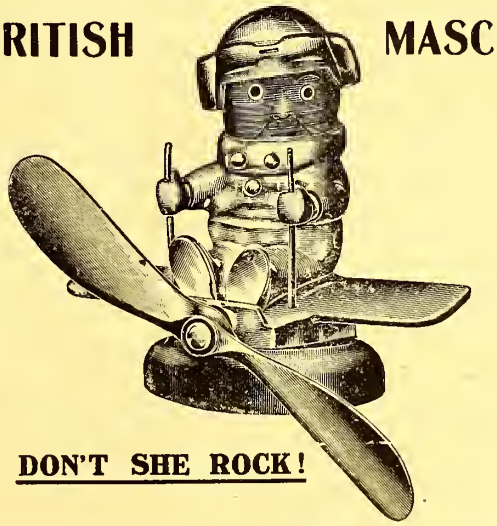

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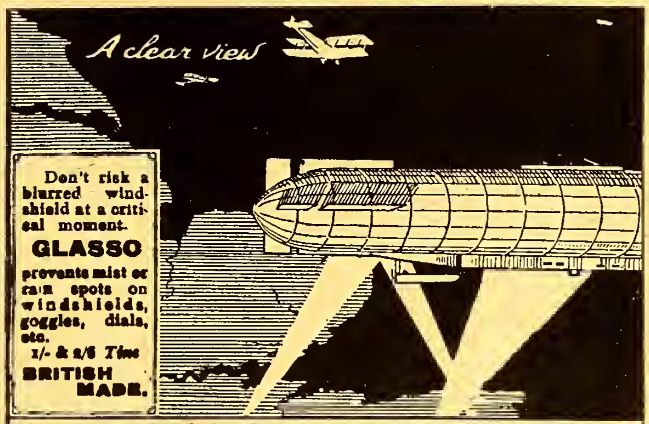

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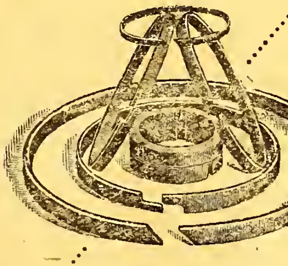

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WEDNESDAY, JANUARY 17, 1917

Edited by C. G. Grey

Vol XII. No. 3

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ON SOME GOOD RESOLUTIONS.

The proper thing, in England at any rate, is to make good resolutions for the New Year, and one might suggest to the average Englishman that the best resolution he can make is to do his best to help to win the war as quickly as possible. Frankly said—to adopt a favourite phrase of our much-decorated friend the sous-lieutenant Louis Noël—most people are becoming bored with this war, and the sooner it is over the better, though naturally the overpaid workman and the "munitioneer" will be sorry.

Mark you, I have only stated that one *might* suggest such a good resolution. It would probably be a dangerous thing to suggest it seriously, or to induce anyone to make such a resolution, for the chief feature of a New Year resolution is that it is invariably broken before the first month of the year is out. And furthermore, the fact that so many people are becoming bored with the war is rather a hopeful symptom. Nothing bores an Englishman so much as being bored. Consequently, when he becomes bored enough he is quite likely to rise up and exert himself seriously to remove the cause of his boredom.

So far the majority of the people in this country have been earning more money, eating more food, and drinking more beer than they have ever done in their lives. Also they have been working longer hours, but I should hesitate to say that they have been doing more work. The British genius for misorganisation has produced the long hours and the high pay, without producing a corresponding increase in output per man-hour.

Now, however, the increased consumption of food and drink, and the appalling consequent waste of foodstuffs, is causing a real shortage of certain foods. Misorganisation everywhere, in the Navy and Army quite as much as in the home of the ordinary improvident Englishwoman, is the cause of this shortage far more than is the German submarine campaign. When you have some twenty millions of people, at a moderate estimate, all eating and drinking and wasting twice as much as they did before the war, you need supplies for just an extra twenty million to keep them going. So, what with Admiralty waste of shipping, official mismanagement of docks and wharfage, and general inefficiency in the organisation and use of labour, it is not surprising that there is shortage in certain directions.

FOOD AND DRINK CONTROL.

When the Food Controller gets to work properly, and greedy people have perforce to live on rations, the nation will become really bored with the war, and will start in seriously to end it.

One sees that the shipbuilding employers on the Clyde have actually agreed that the use of alcohol ought to be prohibited. It is only surprising that they should have taken two years to make such a discovery. Alcohol in any form is at best a medicine, it may be harmless when used in moderation as a luxury, and at worst it is a poison. Certainly it is the most commonly used poison in this country, and its absolute prohibition would be decidedly useful at the present moment.

Far be it from me to suggest that the Flying Services as a rule drink to excess, but I fancy that most people will agree with me that those cocktails before lunch and before dinner do no good of any sort. Even if a man comes in tired and feels that he would like one drink before a meal, will he pretend that he is any the better for three or four more on top of that, which he has to have because there happen to be three or four other people in the club or mess, each of whom feels it his duty to "stand a round" because it is "as done"—for of course the No Treating Order is as dead as mutton except in public houses which are under police surveillance.

GOOD MEN WASTED.

And in the Flying Services one has seen more than one good man go to the dogs through drink, or become fat and flabby and useless through just the excess of alcohol which falls short of taking to drink in the usual acceptance of the term. More men take to drink because of the "have another" or "just one more round" custom than because they like alcohol or because they really feel the need of it. And the simple prohibition of the sale of alcohol would stop all this nonsense straight away. Alcohol has been prohibited in Russia and in France, and though some secret drinking still goes on, the general effect on the *moral* of those countries is excellent. Similar prohibition in this country would have still better effect, because the Englishman has always been more addicted to drunkenness than the Frenchman.

The course legislation should take should be the prohibition of the production of alcohol. If none were produced, except in medicinal quantities, none could be consumed, and it would be much simpler to stop production than to check consumption. Moreover, the material used in breweries and distilleries is good feeding stuff for man and beast, so that the material thus saved would increase the supply of cattle food and would increase the quantity and decrease the price of beef—which is far more important than beer for the national welfare.

THE NATURAL WAY TO EFFICIENCY.

The natural consequence of more beef and milk, and less beer, would be to increase the output of munitions of war, by increasing the bodily power of the workpeople, which is to-day undermined by alcoholic excess.

When one thinks of the millions of pounds worth of food-stuffs, coal, machinery, and labour sunk annually in producing this country's alcohol, and when one thinks of the more useful purposes which could be found for that food and coal and machinery and labour in war time, one begins to see one reason why this country is so slow in exerting her full strength towards winning the war.

This kindly note is not the outpourings of a teetotal fanatic who talks without knowledge, for I suppose that I have paid in my time rather more than my share of the nation's contemporary drink-bill; it is merely a perfectly sound argument in favour of increasing the nation's efficiency at the expense of its chief bad habit.

The point is that, with a limited supply of food and absolutely deprived of alcohol, the people would soon step the war through sheer boredom, because, being deprived of two of their three or four chief interests in life, they would begin to take a real interest in the war.

A Chance for Ability.

As it is, quite a number of people do not, even yet, realise that there is a war going on. I think I can claim to have done my share in hammering at the late Government in print, in this paper and others, over my own name and others; in agitating for greater activity and more intelligence as concerns the equipment and use of the Flying Services; in supplying material for platform and Parliamentary agitators with the same ends in view; and in generally making myself a nuisance that the days of my young friends might be longer in the air that the Lord giveth them. But that does not in the least imply that I believe foolishness and ineptitude to be the prerogatives of officialdom, or even of senior officers in the Services, or that I believe the British manufacturer or tradesman to be a white-haired boy free from guile and an infant prodigy at the same time.

At long last the abler officers of the Services—in all branches, not the Flying Services only—are beginning to come out on top, and it seems as if able, and possibly even honest, politicians are going to try to run the Empire. There is any quantity of ability underneath in official positions, and in the Services, but hitherto it has been overlaid by self-seeking incompetents, possessing just enough ability to scheme their way to high positions and hang on there.

Now one hopes to see honesty and ability have their chances. And so we may yet win the war. But to do so the quicker, the British business man must be shaken up to a realisation of the seriousness of the position. Therefore it may be well to give an example of his methods taken from life, disguising only names, places, and actual materials, which might lead to identification and to a subsequent libel action.

ON SOME PICTURES FROM LIFE.

A certain friend of mine, named, let us say, Roberts, is employed in the construction of aircraft, and naturally requires material wherewith to make them. Such things as sheet steel, tubing, stampings, castings, and so forth he has to buy, and that is where his troubles come in. You see, many of the firms who deal in such things are old, solid, not to say stolid, English firms, who date back to long before the advent of aircraft, and cannot quite understand why these aeroplane people are always in such an infernal hurry. They belong to the circuitous routes of the stage-coach and horse-wagon days, and do not appreciate the direct methods which have produced the 140-miles-an-hour aeroplane, and the irresistible caterpillar-tank which goes straight across country.

Anyhow, Roberts badly wanted some sheet brass, and he wanted some special metal stampings, so he set forth himself one day to get them, after they had been on order for a month or two, and when all the woodwork of the rest of the machines was waiting for them.

First he telephoned to the stamping firm, whom we may call Huggins, who informed him that the stampings would have been ready long ago, but that they could not get the special metal from the firm from which they had ordered it some six weeks before, a most respectable and old-established house, Bloggs by name, of whose probity and good intention they had no possible doubt whatever.

Off went Roberts to the house of Bloggs You will note that a concern always becomes a "house" when it is too musty and moth-eaten in its methods to be either a shop or a business.

Arrived at the Maison Bloggs, Roberts desired to see the "boss." A most respectable assistant behind the long and dimly lighted counter inquired amiably for Roberts' card, whereupon Roberts told him his and his firm's name, and bade him to hustle and find the Head of the Bloggs firm, as he wanted to tell him something about the war, an episode in history of which the amiable assistant might not have heard.

Speeding the English Business.

The firm's name seemed familiar, even if the war did not; so, after a considerable wait in the religious gloom of the "warehouse"—it was much too dignified to be a mere shop—an affable gentleman of the older commercial school, with the air of an Archbishop's butler, appeared, and inquired saponifically what he could do for Roberts. A civil but brief request to know what had happened to the special metal ordered by Huggins some six weeks before produced the rather grieved reply that the Head of Bloggs's could not say, but that he had a remembrance of Messrs. Huggins ordering some such material at some time.

Roberts thereupon suggested that the Staff of Bloggs's should forthwith hunt up their card-index and find out. This merely produced an expression as of pity for one who would imagine such blasphemy as that so old-established a "house" could use anything so vulgarly modern as a card-index. The head of the house stated, however, that the "counting-house" would consult its books if Mr. Roberts would wait.

Mr. Roberts did wait, for some ten minutes, and then waded into the kind of indoors conservatory in which, but for the respectable dust of centuries on its windows, he might have seen the hunt for the Huggins order in full cry. Therein he discovered one whom he described as the missing link between a solicitor's clerk and a bald-headed gravedigger, delving in ancient and mice-bitten tomes with the intense air of a British Museum reader, and ever and anon lamenting that he could not discover the honoured name of Huggins.

A Modern Horror.

Seeing that antiquarian research was hopeless, Roberts went out, and, finding again the Head of Bloggs's, elicited the astonishing information that upstairs in the Head's own private office the House of Bloggs had that horrible innovation, a telephone. Within three-quarters of an hour, almost a record for the London Telephone System, and without being connected with more than five wrong numbers, or being disconnected in the middle of his conversation more than three times, Roberts obtained from Huggins's the date, number, and precise wording of the order to Bloggs's.

A further research in the archives of the House of Bloggs discovered that a letter had been written—not typed—to Huggins's some time after the date of their order, acknowledging the receipt of their honoured favour of the so-and-soth, assuring them of the immediate attention of the House of Bloggs to their esteemed order, and soliciting the continuance of their valued patronage. And there all trace of the matter finished. Apparently the esteemed order aforesaid had gone out and lost itself in the mazes of modern Babylon.

THE RAILWAY WAY.

Whereupon Roberts, who, like

"Exeter Battleby Tring had laboured from boyhood to eld
On the Lines of the East and the West, and eke of the North and South,"

addressed himself in the vernacular of the railwayman in a hurry to that extinguescent relic of English commercialism, the Head of the House of Bloggs. He besought him by Tubal Cain and all his Gods, from Vulcan to Stephenson, to explain how the blazes the R.F.C. were to strafe Huns on aeroplanes which were waiting for fittings to be made by his firm from stampings to be made by Huggins which were to be made from special metal supplied by the House of Bloggs, when the benighted Bloggs and all his blinking blighters of a staff had forgotten that the stuff was ever ordered, had forgotten that there was a war, had forgotten that they were alive, and would probably forget to die, and so would unfairly escape the particular private Hell which he would personally entreat his old friend Beelzebub to prepare for them.

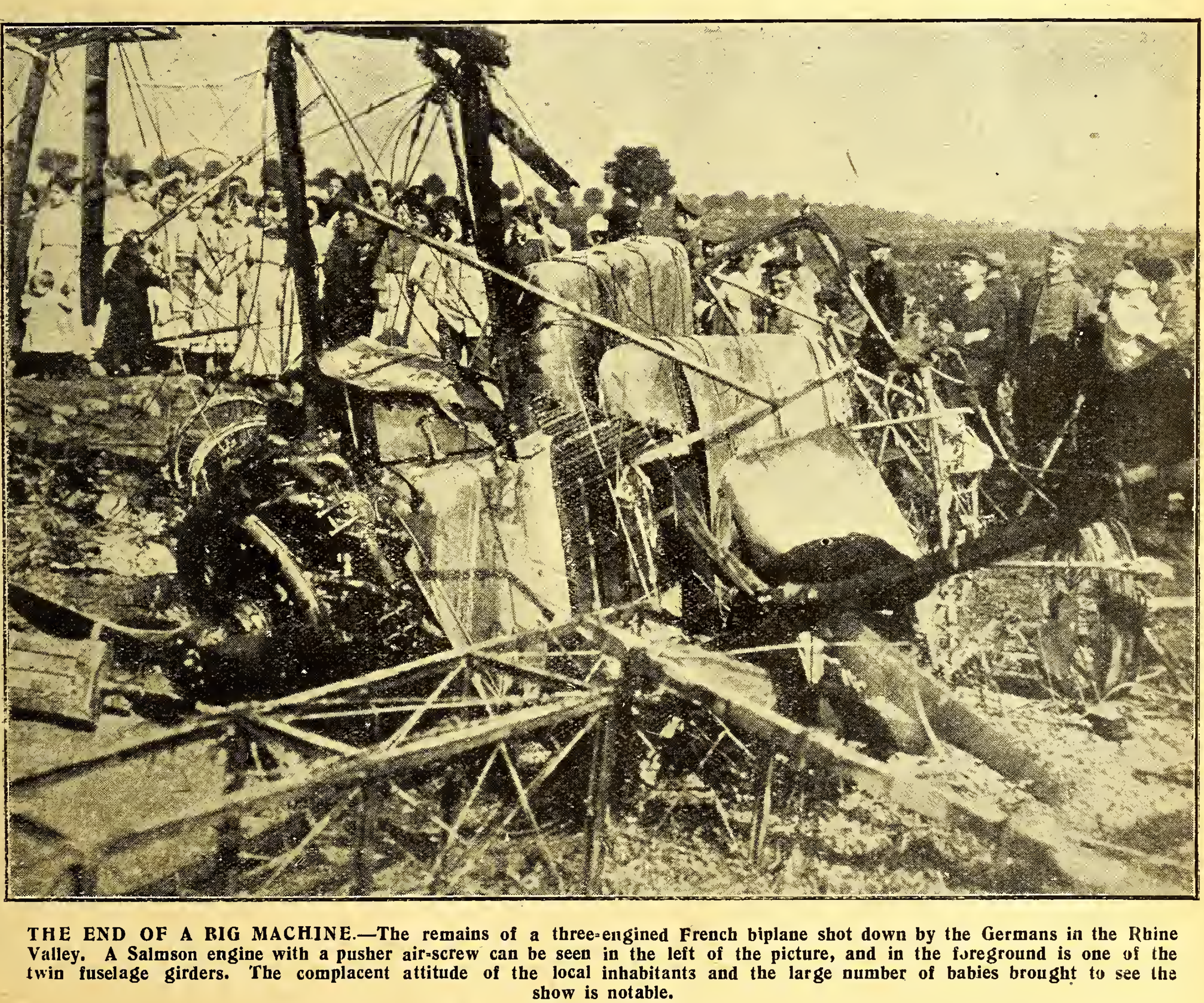
Having thus partially unburdened his mind, so far as seemed fitting to him among such eminently respectable environment, and having shaken the House of Bloggs into a state of almost human intelligence, Roberts succeeded in penetrating with the amiable assistant into a kind of heavily besmirched Cave of Chu-Chin-Chow, where were precious metals of many kinds, stowed in vast heaps, and there he discovered the special metal required by Huggins's, which he himself lugged forth, put into a bag, and labelled to Huggins's works, depending upon the shock he had given the "house" for enough galvanic effect to ensure the dispatch of the stuff when the carrier called for it.

A SECOND PICTURE FROM LIFE.

Thereafter, having absorbed well-deserved refreshment—alcohol being justified medicinally in this case—he journeyed otherwhither to the firm of Gupps, where the strip brass was on order. Here he found another typically English business firm, of a distinctly different type. He entered a small match-boarded hall, ended by a door in which was a pigeon-hole through which to espy visitors.

Sounds of revelry behind the door suggested that a Scottish reel performed in hob-nailed boots to a whistled accompaniment was in rehearsal. Apparently the electric bell did not work, and, as knocking merely seemed to operate as syncopation to the boot-beats, Roberts pushed open the door and beheld two youths of the clerk-errand-boy type busy practising a species of step-dance.

One of them lounged over to him and ejaculated "Wotjerwant?" He said civilly enough that he had come about some strip brass on order. "Warejercumfrum?" asked the hobbledehoy. He explained briefly. "Orl right. I'll git the guv'ner," said the *chargé*



THE END OF A BIG MACHINE.—The remains of a three-engined French biplane shot down by the Germans in the Rhine Valley. A Salmson engine with a pusher air-screw can be seen in the left of the picture, and in the foreground is one of the twin fuselage girders. The complacent attitude of the local inhabitants and the large number of babies brought to see the show is notable.

d'affaires, and disappeared. Meantime the other youth sat down at a desk and pretended to do some work.

The "Guv'ner."

Presently in came the "guv'ner," a cheerful enough specimen of the small English manufacturer, smoking a cigarette. To him Roberts explained what he wanted, and Mr. Gupps remembered the order distinctly. He remembered that it had come a few days ago and would be dispatched to-morrow.

Roberts pointed out that the order was about two months old, and ought to have been delivered to-morrow of five weeks or so back. Whereupon Gupps proposed to find the order and prove his assertion.

He vanished upstairs, and some ten minutes later came down with the order, which had evidently been torn into a number of pieces and then stuck together on a piece of Mr. Gupps's official notepaper. Roberts was not quite sure whether it had been torn accidentally in mistake for waste-paper, or whether Gupps first intended to destroy the evidence of his chronological inexactitude, and afterwards repented on remembering that Roberts probably had a copy of the original order. Anyhow, the sticking together had evidently been done while Gupps was upstairs.

Injured Innocence.

Presenting the order to Roberts with an air of injured innocence, Gupps admitted that he was quite right about the date, but pointed out that it was his own fault that he had not the stuff, because he omitted to send a "Schedule A" certificate with the order, and so the stuff had been allowed to go to another firm which wanted it badly and had had the forethought to send the magic "A" certificate with it.

Roberts suggested that in the absence of the said certificate Gupps might have written and asked for one, to which Gupps replied that the firm was very busy and very short-handed, and that their correspondence was already heavily in arrears, without adding to their work by repairing other firms' omissions.

Roberts agreed that their correspondence probably was behind-hand, and was likely to be, so long as the office staff turned the office into an imitation music-hall. He further opined that, if expense stood in the way of postal communication, the firm of Gupps might have sent a postcard and have nipped an inch or so off the strip brass to pay for it, or, as an alternative, they might have telephoned, and have nipped as much as six inches off the strip to cover working expenses.

To this the ingenious Gupps replied by saying that the London Telephone Service was so badly organised that he really could not afford the time to telephone, though he would not grudge the money.

Here Roberts took a long shot, and offered to demonstrate that the act of telephoning would only take a few minutes, if Gupps would lend him the instrument.

Gupps piloted him up some dirty stairs into a still dirtier office, where papers and samples of metals and feeding implements and stale food were all mixed higgledy-piggledy, and there showed him the 'phone. Watch in hand, Roberts called up his own office. The Gods were good to him and blessed him in that moment with an intelligent operator and a clear line simultaneously, so that in ten minutes he had got through to his own order department and had verified the fact that Gupps had never even taken the trouble to acknowledge the receipt of the order.

Toujours la Politesse.

What Roberts said to Gupps about the entire absence of business methods and of the most elementary organisation in his office may not be set down in a respectable paper like this. He was not angry; he was merely freezingly polite. In fact, if Gupps's metal products had included the manufacture of the historic brass monkeys, they would certainly have been afflicted with the traditional frost-bite. Anyhow, Gupps retired hurt, and Roberts retired in a taxi accompanied by a sufficience of brass strip to cover his needs for a week.

Movements in the Metal Market.

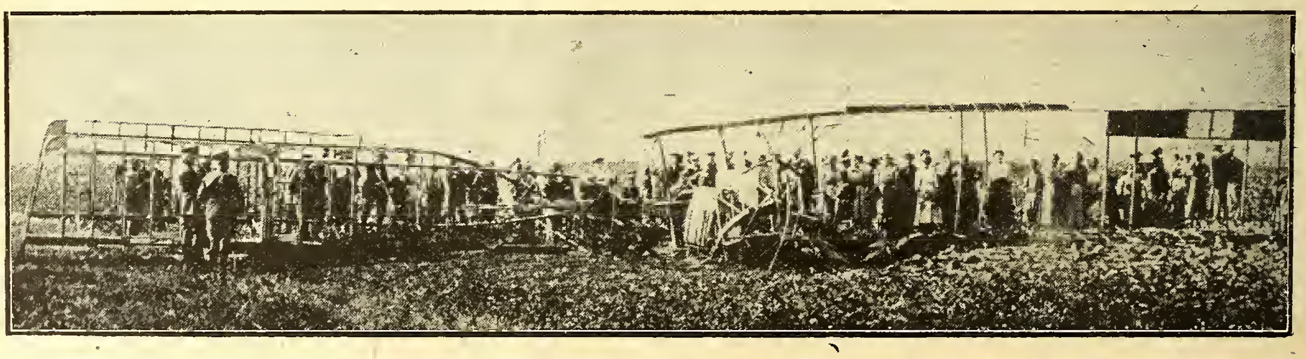
There is another story of how the same Roberts fell foul of another highly respectable firm which had only delivered part of their order, and excused themselves for not delivering the rest on the grounds that the Inspector for the particular Service concerned had delayed inspecting the stuff, although it was ready for him days before; and of how Roberts walked uninvited into the Inspector's office and learned that the Inspector had never been asked to view the stuff, and that the bench on which it was now ostentatiously displayed had been vacant half an hour earlier. But there is no room to go into further sordid details. It is enough that he got his material promptly—when he went and got it.

Do It Now.

That is precisely my quarrel with the British shopkeeper. If one wants a thing done one has to stand by and watch it being done, or put up with a long delay and then go and fetch the finished product. In time of war, as we are to-day, every man ought to be speeded up to his utmost, and if he does not know the meaning of the word hustle, he ought to be taught. It really looks as if Mr. Asquith's motto, "Wait and see," is the working, or idling, principle of the whole nation.

With such a mis-Government as we have had for the past ten years or so, one can scarcely be surprised that the people need speeding up, and, after all, the people elected the Government, so possibly it was truly representative of the people.

As the new Cabinet has skilfully elected itself, it perhaps does not represent the people, in which case there are distinct hopes of its being a success, for it may be able to govern the people instead of merely reflecting or representing them. Anyhow, the New Government starts the New Year full of good resolutions, so let us hope it may keep some of them.



A general view of the wreckage of the big machine illustrated on the preceding page. The necessity for the further protection of aircraft from fire is evident.

. The .

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ON THE SUPPLY OF AIRCRAFT.

As concerns aircraft supplies under the reconstructed Air Board, if the members of the Board, or the Ministry as it is to be, resolve, and maintain their resolve, to go to the bottom of the trouble, all will be well. There is no lack of labour and material for the production of aircraft in this country if these sources of production are properly handled.

The output of existing factories can be largely increased under proper organisation. It is not so much that the factories themselves need reorganising, though some of them could be improved. It is the system of contracts and the supply of material that needs reform. And there are vast resources available outside existing factories.

Cutting off Contracts.

First of all, contracts for obsolescent machines should be cut off short, as soon as a particular type is found to be useless. I have in mind a case in which a certain firm had an order to build 24 school machines for the Navy. The first machine was just delivered when the "experts" discovered that the type was not satisfactory—although dozens of pilots had been trained on it. Consequently the type was deleted.

Nevertheless, the Admiralty insisted on the other 23 being delivered from the works to the test aerodrome, a matter of nearly 100 miles away. There the machines were solemnly and carefully put through their acceptance tests, at a cost of about £40 apiece to the makers, and at the expense of much good petrol, not to mention wear and tear of engines. After which the machines were condemned, and left in the open to rot till they were sufficiently wrecked to be burnt.

Woeful Waste.

To-day, this very day on which this paper is being read, machines costing thousands of pounds apiece are being built in excellently organised factories, in execution of contracts placed not many months ago, and those machines when delivered will never be used on active service, but will probably be condemned to be burnt, after the engines have been removed.

The same excessive care is taken in building them as if they were the latest type destroyers. Numbers of parts are rejected as not up to standard, and so a large amount of "scrap" is produced in building these machines, which must be perfect, according to regulation, before delivery, although themselves merely scrap when finished.

This example of system run mad would be a huge jest, if it were not for the underlying tragedy of Service aviators crying out for up-to-date machines while man-power and material is being wasted on deliberately building scrap. And think of the acres of fabric wasted in this way at the very time when the Government is forbidding the use of certain grades of flax for other than aircraft use.

Here is a nice little subject for the Air Board to tackle for a start.

Man-power Going Begging.

Apart from such waste of man-power as this, there is man-power going begging in other businesses which might be turned on at once to aircraft production.

The other day I was talking to a man in the piano trade, who told me that for many months past one of the big British piano firms has been selling 1,200 pianos a week at 40 guineas apiece in their depots in three only of the big manufacturing cities in the North of England. That is to say, £50,000 worth of pianos a week, or at the rate of £2,500,000 worth per annum. I will not guarantee his figures, but he is not likely to be very far out.

Now the piano maker is by his training a ready-made aeroplane maker, for he is used to combining the finest wood-work with high-class metal-work. So here you have the equivalent in man-power of at least another 2,000 aeroplanes, and probably 10,000 under proper organisation, being wasted in producing musical boxes for the profiteers in the North.

And this country is supposed to be using its man-power to advantage. It sends skilled workmen almost past military age into the trenches, or rather into hospitals at the nation's expense, while it leaves thousands of men working at what are purely luxury trades.

Using Scrap.

Hereinbefore I have mentioned the rejection of parts by official inspectors. Naturally Service machines must be as perfect as humanity can make them, but inspection is frequently carried too far. Parts are rejected for surface defects which in no way decrease the usefulness of the part. And the system of inspection for school machines is as rigid as that for active-service machines.

Vast quantities of the material that is scrapped could be used perfectly well in machines intended only for school work. One of the best machines I ever knew was deliberately built by a certain firm out of A.I.D. rejects, and was used regularly by the firm's test pilot as a conveyance from aerodrome to aerodrome instead of using a car.

Cutting Losses.

It is well to understand clearly that cutting losses on obsolescent types may save not only money but lives—directly and indirectly.

A new type of machine, better than any of its predecessors, is produced at least once in three months, and if our people abroad are to regain and hold the command of the air, the fighting men must have the latest types all the time.

And it must be remembered that no matter how good a pilot may be he cannot judge the value of a machine in war unless he is actually on active service. Enemy machines change, and fighting tactics change with them, so only a pilot immediately from the front can gauge the value of a new type.

When once the active service pilots approve a new type all losses on older types should be cut, and all man-power concentrated on the new types.

Concentration on New Types.

Concentration of man-power in this way does not mean literally that aeroplane makers are to make nothing else, for school machines are always needed, and experiments on new machines must be made.

Every factory should have its experimental department, which should be the owners' private concern, and quite free from interference by official technical "experts." Here the firm's designers should be constantly trying to beat the world's best. And the firm's test-pilot or pilots would have the job of demonstrating whether the firm's latest machine was safe or not. After that had been proved the machine should be flown and judged by selected pilots brought direct from the Front for that purpose.

The rest of the factory should be turned on to produce whatever type the Air Board requires, and should be entirely under official control, with official inspectors in all departments to see that the work was up to official standard.

If that firm's new type were proved superior to those on active service, it should be adopted at once without further argument, and produced in quantities. The material in hand for the previous type should be scrapped, or merely built into school machines.

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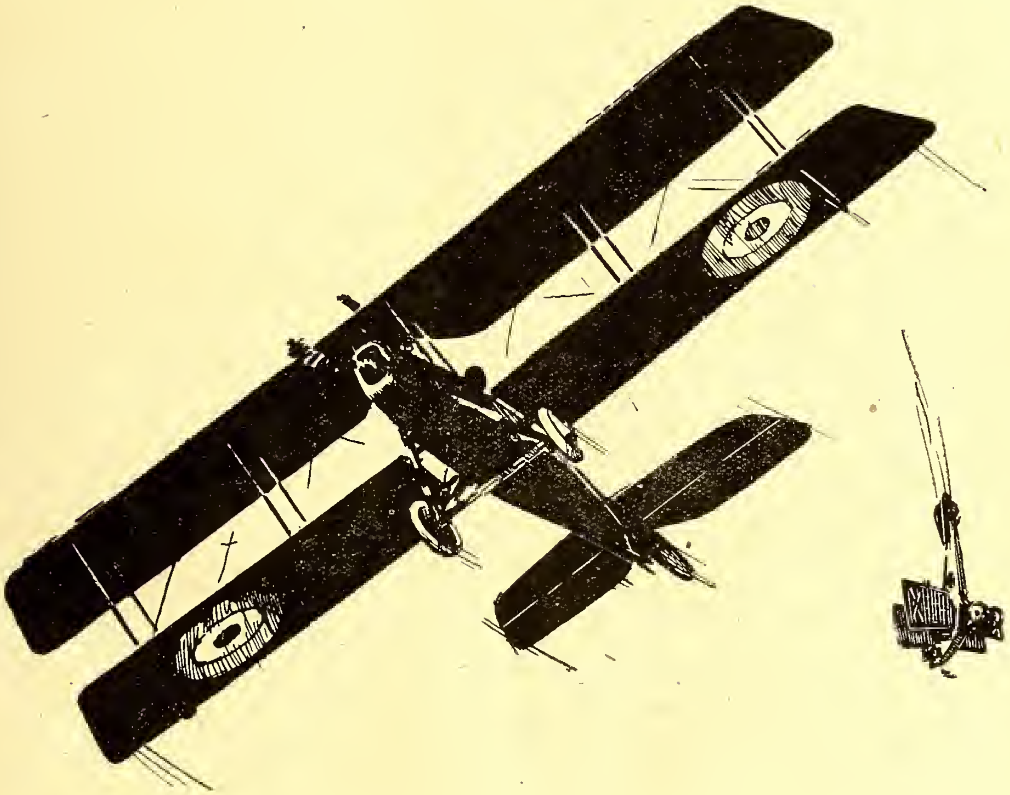
A BRITISH PILOT AND A—



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Standardisation Savings.

With proper standardisation of parts, especially such things as nuts and bolts, screw-threads, wires, tubing, wheels, and minor fittings, the losses in changing types would be very small, for the bulk of the material in hand for the old type would be usable in the new type.

If designers were compelled to design to certain standard fittings, they could ring innumerable changes on their aerodynamic designs without changing the material, except some few wooden parts, which are anyhow the cheapest parts in any aeroplane.

Proper standardisation would simplify very greatly the problems before Equipment Officers, who have to maintain a full supply of spare parts for every machine in their squadron.

Reproduction.

When the new type came to be reproduced in quantities, a complete machine should be sent to each sub-contracting firm, whose draughtsmen could then make drawings from it, while the works management was having templates made to the various parts This would be vastly quicker than waiting for drawings from the original designer, and waiting for corrections in the drawings—as is the usual custom.

If alterations had to be made in the first design, machines in process of construction should not be hung up pending alterations—at any rate so long as the alteration was merely an improvement and was not necessitated by any radical defect discovered through something going wrong with the machine.

Machines should be laid down in batches of a dozen or so at a time, and any alterations should be made in the next batch to be laid down.

When a new type was adopted the batch in hand would be completed while the new type was being laid down. In this way there would be no cases of works standing still waiting for fresh orders, as has so often been the case in the past.

The Proper Use of Engines.

It is well to remember that though aeroplane types change very quickly, engines change much more slowly. Also engines, if properly tended, last longer than aeroplanes on service. An aeroplane gets out of truth and deteriorates rapidly in the field. An engine is overhauled and put back into use in a few hours. Consequently new type aeroplanes are constantly designed to take old type engines.

Therefore, when a new type aeroplane is produced, it might well be put promptly into use abroad by sending batches of the new machines minus engines to squadrons in the field, and allowing the squadron workshops to transfer engines from their old machines to the new.

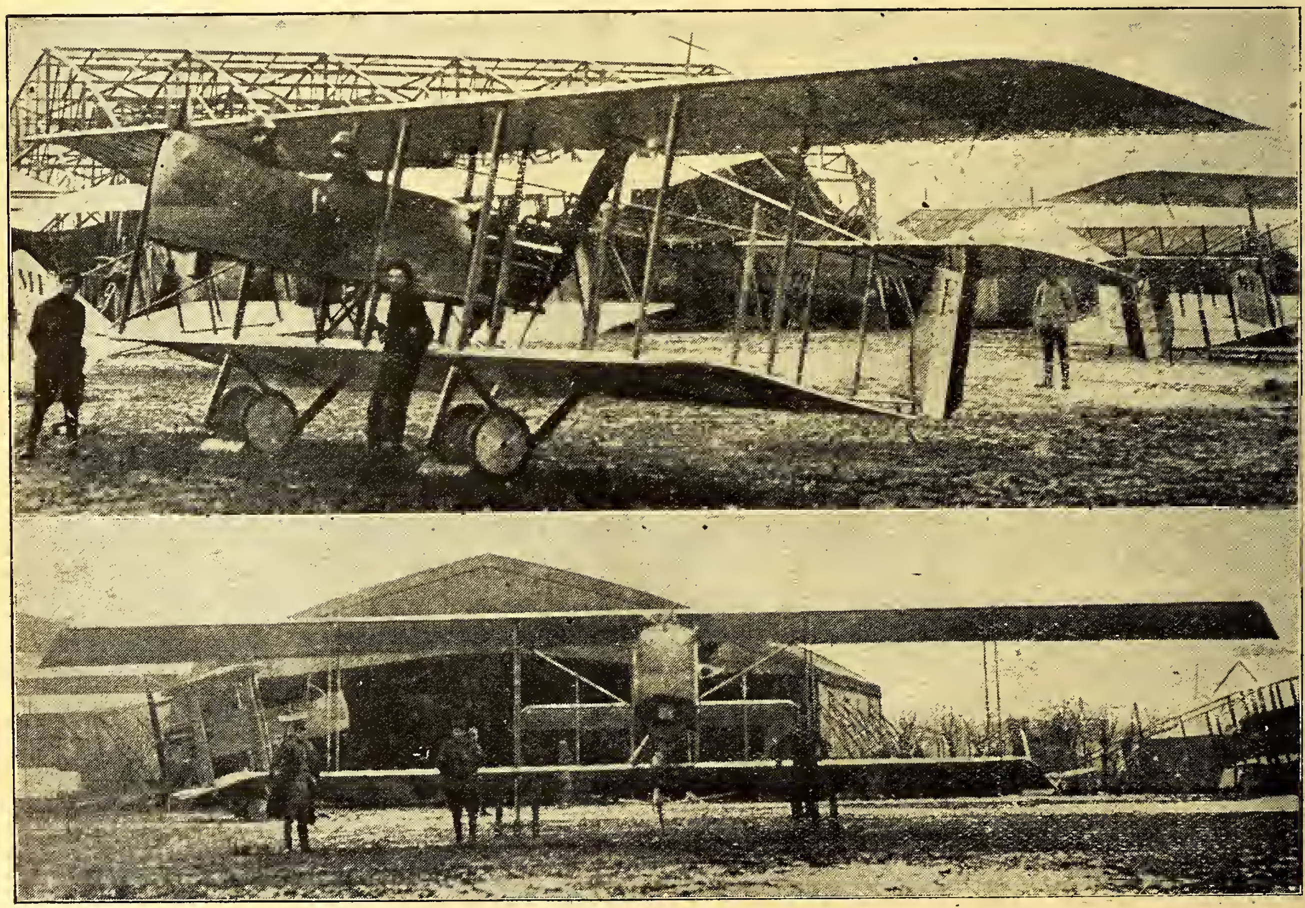
This would save much of the present delay, by which new aeroplanes are kept at home waiting for engines while pilots at the Front carry on as best they may with their old types.

Some acceleration might also be secured by fitting into new type machines engines which have been rebuilt after being damaged on active service, instead of waiting always for brand-new engines.

This is the more so because it frequently happens that rebuilt engines done up by a good firm are better than new ones built by a less reliable firm.

Robbing Peter.

I quite realise that an aeroplane on active service needs two or three engines, so as to have a spare always ready, and that these rebuilt engines would normally go to the squadrons as spares, so that my suggestion may look like robbing Peter to pay Paul. But I take it that if an engine returned to the Front not in a case as a spare, but as part of a complete new aeroplane, better than the one



An Official Photograph of a Farman biplane of fairly recent type, combining features of the Henry and Maurice Farman, and, therefore, colloquially known as the "Horace."

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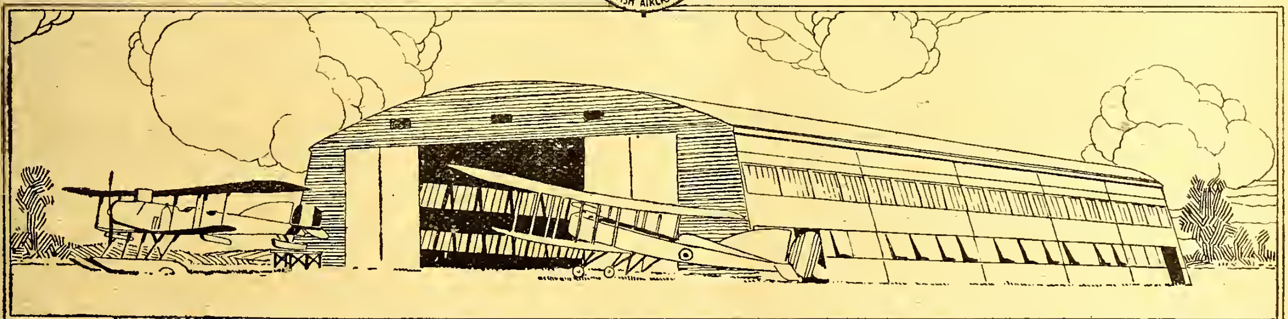

to which it previously belonged, no one in the squadron would grumble much when the old and war-worn aeroplane was deleted.

Refitting Squadrons.

It may be objected that this would mean sending a new type machine to a squadron equipped with another and older type. It does not, for with proper administration at home that new machine would go to a squadron already equipped with similar machines of an earlier type.

Or, better still, a batch of a dozen or more such machines, complete with spares, would go at the same time to the squadron, and so would replace all its machines of the earlier type at once.

And here one comes up against another point which deserves attention.

Introducing New Types.

It happens on occasion that a squadron may remain on active service so long that its machines become out-of-date compared with the enemy's latest fighters—especially in the case of fighting squadrons. Nevertheless, thanks to a skilful commander and to the bitter school of experience, such a squadron may survive for a long time, and learn all there is to know about fighting tactics in the air.

Presently a new and better type of machine is evolved. Squadrons of such machines are formed at home, and manned with new pilots fresh from the schools who have had no experience of fighting. The new squadrons go out on active service, and, despite their superior machines, suffer casualties from sheer lack of experience. Meantime the old squadrons suffer casualties also, from lack of speed or climb in their old machines. Would it not be better to mix the personnel rather more?

A new pilot joining an old squadron at the Front would learn the tricks of the trade more quickly, and, when out on a fighting patrol, would receive much protection from the veteran fighters. Several veterans withdrawn from a squadron at the Front to a new squadron forming at home would teach aerial tactics to the new pilots before they went out, and, being themselves mounted on new and superior machines, would be more valuable than before when they arrived in the field. Also, they would stiffen the *moral* of the new squadron and help to transform mere headlong bravery and the rashness of youth into military virtue, according to Clausewitz.

Absolute New Fighters.

When an absolutely new and startling type of fighting machine is about to be sent out, as may perhaps be the case very shortly, and as was the case when the little de Havilland and the F.E.2d appeared, it seems that, instead of being sent out in ones and twos, as was then done, so that the first samples go to the enemy, they should be sent out in complete squadrons.

Those squadrons should be manned entirely by veteran fighters, without a single novice among them. Then each squadron would be of the maximum value in providing a shock for the enemy. The skill of the experienced fighters, increased by the startling performance of the new machines, would make a clean sweep of the enemy's aviators wherever they appeared. Moreover, a rest of a week or two at home, while the veteran squadron was refitting and getting used to its new machines, would do no manner of harm to the pilots and gunners.

Surprise is the essence of successful attack, and it is only in the air that successful surprises can be achieved in these days—tanks notwithstanding.

An Easy Supremacy.

By skilful handling of the problems of supply the Air Board can easily make this country supreme, so far as the quantity and quality of its aircraft are concerned. By skilful handling of personnel the Administration of the Flying Services can equally easily secure and hold the Command of the Air. And in both cases those responsible will do well to sink all prejudices, and personal dislikes, and feuds, and suspicions, and to seek advice on all hands from those who can give it.

The most humble mechanic, or the most rampant agitator, may know something which will help to win the war, and the Air Board should have that knowledge.

Let the Air Board's New Year Resolution be, to trust the Active-Service Pilot for advice as to what is needed, and to trust the Manufacturer to give it to them when told what is needed.—C. G. G.

The Rejuvenation of the Aeronautical Society.

The Aeronautical Society of Great Britain is evidently to commence its new lease of life under the most favourable auspices. Its first semi-public activity takes place on Wednesday, January 24th, when General H. S. Brancker, Director of Air Organisation, R.F.C., will deliver a lecture to the members at the Institution of Civil Engineers, Great George Street, Westminster. The chair will be taken at 8 p.m.

This lecture should be of great interest to everybody occupying any position of responsibility in the Aircraft Industry, and one hopes that every designer, foreman, and draughtsman who can get the evening off will make a point of obtaining a ticket of admission from the Secretary of the Society, as there will be much for the Aircraft Industry to learn on this occasion.

As Director of Air Organisation, General Brancker knows precisely what is needed by the R.F.C. at the present moment, and precisely what will be needed in the future. How much he will be able to tell a semi-public gathering on this question one cannot even guess, but it is certain that he will be able to give those who are responsible for the output of aircraft many new points affecting their work, which they have probably not even considered up to the present.

The subject of General Brancker's lecture is the "Teaching of Flying," and, though this might appear to apply primarily to the proprietors of, and the instructors at, the aviation schools, it is obvious that the teaching of flying is intimately concerned with active-service flying. The discussion of the subject by General Brancker will therefore be equally of interest to builders and designers of fighting and reconnaissance machines.

It seems hardly necessary, though it may be as well to do so, to point out that those concerned with flying schools now under Military control, whether proprietors, instructors, mechanics, or pupils, should make a special point of attending this lecture. General Brancker is himself a pilot of notable skill and experience, so that his audience will know that he is discussing matters which are well within his practical knowledge, and that he is not theorising in any way.

The Aeronautical Society is to be congratulated on securing as Secretary the Services of Mr. Wilfred Barnard Faraday, who has had great experience of organising work, and under whose administration the importance of the Society should progress rapidly. Applications for tickets for the lecture should be made to him at 11, Adam Street, Adelphi, W.C.

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The Advantages of War.

BY "BERKELEY."

The blessings of Peace are immortal. From the anæmic Christmas-card of the Victorian Era to the great philosophers of all countries and all ages a dove-like peace has been extolled by all, to the utter discredit of war. It has been admitted that war as a sport, viewed from afar, is worthy of praise, but rarely has the industrial and social value of physical combat between the nations been recognised. War is an annoyance to some financiers, a pleasure to others, and a permanent joy to the aeronautical industry. It justifies the maintenance of a Navy and an Army, and thus brings brilliance into the national life.

That war is a biological necessity may be a view held by the common enemy, but even the German may be conceded intelligence when such a concession proves his cynicism. A warlike race is not only healthier than is one accustomed to the amenities of peace and the pleasures of wordy strife, but it is possessed of a more vital outlook on the problems of existence. That is, when war is not overdone, when it bears its proper relation to the other amusements of life. France, weary of the splendours of the old régime, left the chivalry of earlier wars, and, under the able direction of Napoleon Buonaparte, whose skill was fostered by the genius of Gilbert, a strategist of the old Monarchy, marched to greatness and neglected to stop in time.

WAR AS A HABIT.

War from a necessary amusement became an arduous business. Enthusiasm became habit, and exhaustion held the nation in the after years. Britain, whose devotion to commerce prevents an excessive indulgence in other pursuits, maintained a series of wars beyond the seas in order that the fount of fame should not run dry, but there has been no opportunity for an excess of warlike endeavour. Indeed, the martial spirit has chiefly relied for its maintenance on its combination with the side issues of religion, and the Salvation and Church Armies defending the souls of the *hoi polloi* were far better known three years ago than was that Army whose traditions brook no rival and on whose exertions the honour of England rests.

One main advantage of the present war would appear to be the disorganisation of the financial bureaux of the world and the consequent direction of the flow of wealth into stranger, less accustomed paths. Once in the centuries the pauper tastes easily gained wealth, and the plutocrat thinks sadly of the iniquities of political economy and its axioms. The United States of America are accumulating with the world's gold most of the world's troubles, and perhaps without a general action 1765 and 1812 will be avenged and the spirits of the dead of some British regiments will rest in uncongenial peace.

THE BIRTH OF DISCIPLINE.

Another advantage is the birth of discipline as a national asset. The training of the youth and age of England for the ultimate trial in the fields of Flanders cannot die with the war. It must have its proper effect on the national character in the after years. Germany reached its high stage of efficiency through its centuries of discipline. Each man in the State knew his proper place and his proper value to the nation. Merit and not charm of manner dominated the passage through life of the successful German. In statecraft, in the services, and in civil life, application to work and to the acquisition of the knowledge which gives the power of the greatest results for the least expenditure of labour, won the reward which they deserved.

Militarism may be a curse; but, if so, there is one good thing at least to be said for curses. Militarism, in the proper sense of the word, implies a skilled co-ordination of all effort in the attainment of a stated object. Business in Great Britain, while claiming such a co-ordination, is entirely lacking in the discipline which can produce such a common effort. Abroad, in more places than enemy territory, commerce proceeds with due regard to order and propriety, with the result that for years before the war the vast business interests of this country overseas, gained by the pluck and determination of soldiers and administrators who paved the road for the merchant to tread, dwindled steadily, until the success of one other nation became too obvious to be ignored. The future of British external supremacy depends on the power of those who have learnt discipline in time of war not to forget the necessity of working in unison and obediently to the orders of superior training.

THE ADVANTAGE TO AIRCRAFT.

But to turn for a time to the part of life for which this paper exists, the aeronautical industry has found more advantage in three years of war than could have come in a generation of peace. Two main factors held back the course of aeronautical experimentation—lack of money and the high element of risk in flying itself. The latter prevented a rapid commercial development, for not only was the pilot injured or killed in an accident, but whatever he might be carrying was in great danger of destruction also.

For these reasons aeronautical development wandered in a vicious circle. If money was found for design and construction, there was no guarantee that the aircraft produced would be a commerce-carrier of safety and efficiency. On the other hand, since this was the view of the princes of commerce, no money was available. And so aviation struggled in vain, the design of aircraft improving very slowly as the months went by, but no practical use coming within the sphere of action of aircraft at all, save that of a then seemingly unlikely war.

At last came war. With it was an unheard-of prosperity for aircraft. The Zeppelin in pre-war days was, though the German Government manfully supported its manufacture in view of its probable military value, merely a means of conveying Germans with degenerate tastes over selected portions of the Fatherland, the while they appreciated the marvels of aerial cooking, marred only by the use of aluminium cooking utensils.

WHAT THE AIRSHIP OWES.

The design progressed slowly until the impetus of war gave it new vigour. Speed, rate of climb, height-going and weight-lifting powers were all rapidly increased, until not only is it an excellent weapon of war as the eyes of a fleet at sea, but it has a brilliant future when the war of commerce takes the place of the cleaner combat between the races. Even the Atlantic, which, though it disappointed Oscar Wilds and failed to affright Mrs. Partington, is capable of grandeur, would present no terrors to the modern Zeppelin should a cross-ocean flight be necessary.

As, when peace returns, the anti-aircraft defences will cease to rend the heavens at the mere rumour of the presence of an airship, there will be few real dangers for those who elect to travel by aerial liners on the Zeppelin plan (or any other of equal efficiency). And mails, if people still consider letters a blessing, can be carried in quantities on vessels of even present-day efficiency. The possibility of travelling in favouring winds with throttled engines, when, owing to unforeseen trouble, the fuel supply runs low, has vast attractions, provided favouring winds coincide with trouble. There is little question, however, that the ill-informed public will prefer to travel by a great airship than by an in-

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finitely smaller and more lively aeroplane, until either type predominates in view of higher efficiency.

With aeroplanes, where the scope is greater, the advance in efficiency is out of all proportion to the period of time absorbed. Our friends the enemy have by their gallantry in the air made equal gallantry necessary on our part, and, similarly, the race for domination has made each side improve in craft of increasing size.

There are several outstanding features necessary in an efficient aeroplane. Among them are high speed in the air, coupled with the power of landing slowly and in a small space, ability to climb quickly, and to be capable of carrying increased loads.

Speed has come as a natural result of aerial combats, as also has climbing power. The restricted aerodromes behind the battle front make it essential that machines shall have a low landing speed. This necessity has been attained in a degree unthought of a year or two back. Weight-carrying attributes have similarly increased, though in this matter the present war has the disadvantage of requiring, for the good of the country, that a proper degree of secrecy be maintained, and it is, therefore, not possible to indicate the passenger-carrying virtues of some aeroplanes to-day.

Aerial combats have also brought about a high degree of liveliness in the newer aeroplanes, whose quickness of action is of advantage in the more ordinary business of flying as well as in the more active spheres of the art.

A DREAM FULFILLED.

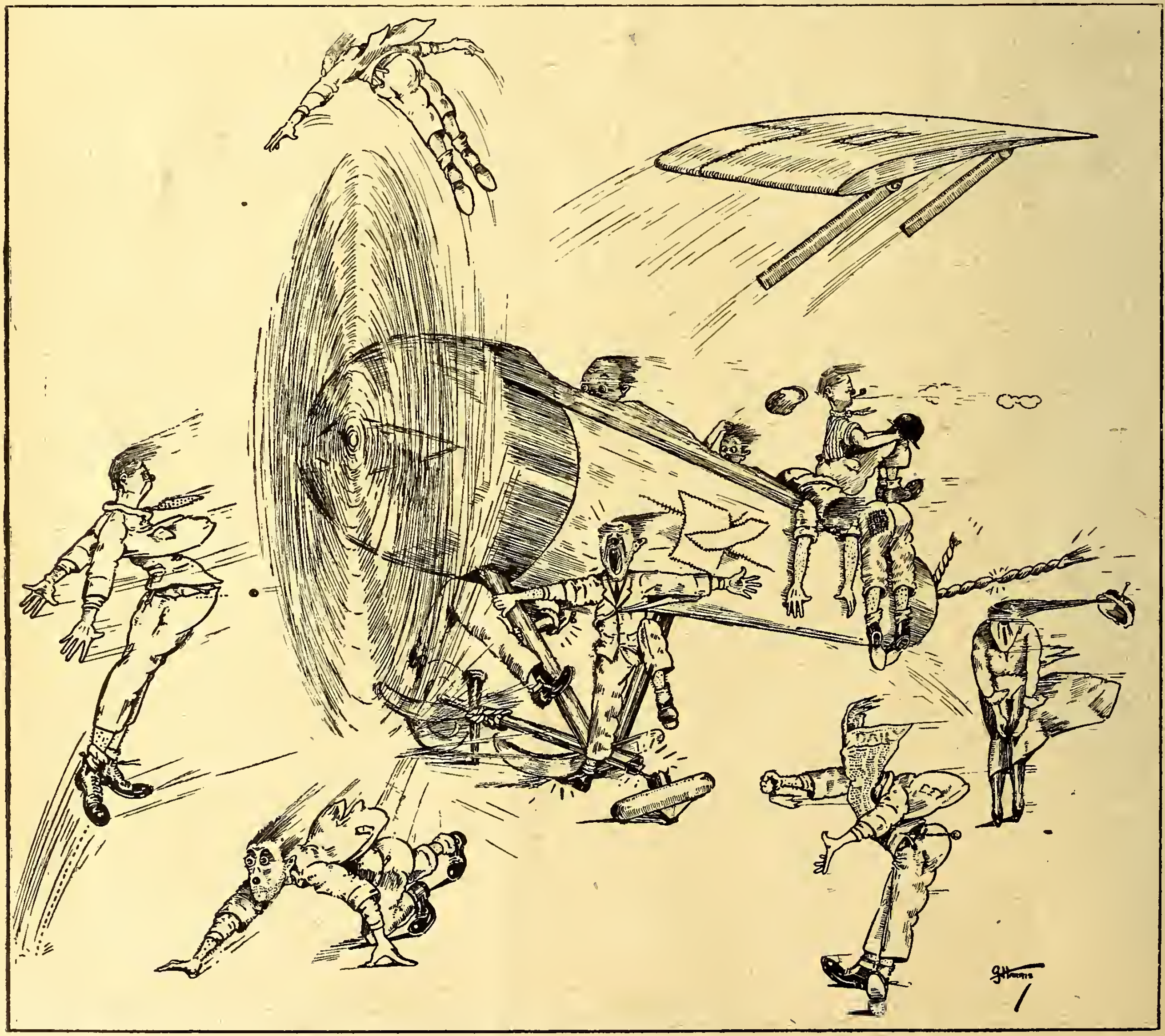
The necessity of maintaining a great number of aeroplanes in constant repair and of accelerating productive standardisation, the dream of the past, has become the reality of to-day. No longer is an aeroplane produced as a work of art alone in its magnificence, but as a unit in a series, each of similar attributes. The advantage is obvious.

The stress of war has shortened the life of aircraft in addition to increasing vastly the numbers required. Consequently all the aircraft manufacturers and dozens of other firms of no previous aeronautical experience are producing aeroplanes to the limit of their possible output. Thus financially the business is becoming more firmly settled as the days drift by.

Experiments can be made with little loss, and the experience of active service widens knowledge in a manner impossible in days of peace.

Hence it is well that the art of war should receive no dispraise from those who fly, or those whose work it is to mount the aviator, if justice is still permitted. Aircraft manufacturers should in mere gratitude refrain from querulous importunings for peace, whether they be possessed of conscientious objections or not. But surely there was never an aircraft manufacturer with a conscience?

[*The Editor entirely disclaims all responsibility for his contributor's beliefs or opinions.*]



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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Jan. 9th, 1917.

War Office, Jan. 9th.

REGULAR FORCES.—Staff.—Attached to Headquarters Units.—The following temp. appointment is made at the War Office:—G.S.O., 3rd Grade.—Sec. Lt. H. L. Webb, R.F.C., Spec. Res., from an Equipment Officer, 3rd Cl., and to be temp. Capt. whilst so employed, Dec. 13th, 1916.

Establishments.—R.F.C.—Flight Commanders.—From Flying Officers, and to be temp. Capts. whilst so employed, Dec. 17th, 1916:—Lt. G. A. Thompson, Canadian Gen. List; Temp. Sec. Lt. J. Blackwood, Gen. List.

Flying Officers.—Temp. Lt. J. C. O. Dickson, Gen. List, from a Flying Officer (Observer), Nov. 7th, 1916, but with seniority from May 6th, 1916. Sec. Lt. F. O. Rose, Essex R., T.F., Nov. 17th, 1916. Lt. W. B. Hutcheson, Canadian Engrs; Sec. Lt. J. B. Hassell, 11th Australian Inf. Bn.; Sec. Lt. R. S. Lewis, R.A., and to be secd.; Sec. Lt. (on prob.) S. H. Bell, Spec. Res.; Temp. Sec. Lt. (on prob.) G. C. Stead, Gen. List; Temp. Sec. Lt. (on prob.) R. Roxburgh-Smith, Gen. List, Dec. 14th, 1916. Lt. G. C. Walker, Lowland Divl. Train, A.S.C., T.F.; Temp. Lt. G. Graham, Gen. List, from a Flying Officer (Observer), with seny. from Oct. 9th, 1916. Sec. Lt. F. W. Nisbet, York. Dns. Yeo., T.F.; Temp. Sec. Lt. G. E. R. Lacey, E. York. R., and to be transfd. to the Gen. List, Dec. 15th, 1916. Lt. T. H. Wickett, 91st Canadian Inf. Bn., Dec. 17th, 1916. Temp. Sec. Lt. G. N. Brockhurst, Gen. List, Dec. 18th, 1916.

Equipment Officers, 3rd Cl.—Sec. Lt. J. Morris, from Unattd. List, T.F., Dec. 6th, 1916 (substituted for notification of Dec. 23rd, 1916). Sec. Lt. (temp. Lt.) H. H. Thomas, Welsh Divl. Ammunition Column, R.F.A., T.F.; Temp. Sec. Lt. (temp. Lt.) J. Durward, attd. High. L.I., and to relinquish the rank of temp. Lt., Dec. 15th, 1916.

Memorandum.—Sec. Lt. (on prob.) J. A. Myburgh, from R.F.C., Spec. Res., to be temp. Sec. Lt. on Gen. List for duty with R.F.C., Dec. 7th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. A. N. Patterson relinquishes his commn. on account of ill-health, Jan. 10th.

* * *

From the "London Gazette," Jan. 10th, 1917.

War Office, Jan. 10th.

REGULAR FORCES. — Establishments. — R.F.C. — Sqdn. Comdrs.—And to be temp. Majors whilst so employed.—Capt. Lord A. R. Innes-Ker, D.S.O., R.H. Gds., from a Flt. Comdr., Dec. 21st, 1916. Lt. (temp. Capt.) G. C. de Dombasle, R. Can. Inf. Regt., from a Flt. Comdr, Dec. 28th, 1916.

Flight Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed:—Sec. Lt. (now Lt.) B. J. W. M. Moore, M.C., Spec. Res., Sept. 30th, 1916. Lt. G. H. Morton, 3rd Can. Pioneer Bn.; Sec. Lt. J. C. Slessor, Spec. Res.; Lt. E. Selby, Spec. Res.; Sec. Lt. (temp. Lt.) H. F. Champion, Rif. Brig., Spec. Res.; Sec. Lt. (now Lt.) E. A. B. Rice, Spec. Res.; Sec. Lt. E. L. Millar, Spec. Res.; Sec. Lt. P. Pralle, Spec. Res.; Temp. Sec. Lt. R. D. Oxland, Gen List, Dec. 1st, 1916. Sec. Lt. (temp. Lt.) A. P. V. Daly, Conn. Rang., Spec. Res., Dec. 20th, 1916. Capt. H. J. Segrave, Wilts R., from a Flying Officer, Dec. 21st, 1916. From Flying Officers, and to be temp. Capts. whilst so employed.—Temp. Lt. J. M. M'Alery, Gen. List, Dec. 21st, 1916. Sec. Lt. T. Macleod, Spec. Res., Dec. 22nd, 1916. Temp. Lt. A. P. Maurice, Gen. List, Dec. 27th, 1916.

Flying Officers.—Sec. Lt. C. L. Baldwin, Spec. Res., Oct. 6th, 1916. Temp. Lt. G. M. Cox, R. Berks R., and to be transfd. to Gen. List; Temp. Sec. Lt. H. E. Davis, S. Staff. R., and to be transfd. to Gen. List.; Temp. Sec. Lt. S. O. Smith, Gen. List; Lt. H. H. Cotton, 5th Canadian Mtd. Rif.; Temp. Sec. Lt. (on prob.) A. Holden, attd. York. R.; Temp. Sec. Lt. I. W. Parnell, Gen. List, Dec. 13th, 1916. Temp. Sec. Lt. H. E. Scoones, Gen. List, from a Flying Officer (Observer), with seny. from June 21st, 1916, Dec. 14th, 1916. Sec. Lt. J. M. Burd, R.A., from a Flying Officer (Observer), with seny. from Oct. 25th, 1915; Sec. Lt. (temp. Lt.) A. W. Todd, E. York R., T.F., from attd. Yorks L.I., T.F.; Temp. Sec. Lt. (temp. Lt.) G. C. H. Dorman, R.E., from a Balloon Officer, Temp. Sec. Lt. T. H. French, Gen. List, Dec. 15th, 1916. Temp. Lt. A. D. S. MacGregor, Gen. List, from a Flying Officer (Observer), with seny. from April 19th, 1916. Sec. Lt. E. V. A. Bell, Hamps. R., and to be secd.; Lt. L. P. Prior, Lond. R., T.F., from attd. 12th Lond. R., T.F.; Temp. Sec. Lt. F. L. Kitchin, attd. Glouc. R., Temp. Sec. Lt. J. E. Hine, Gen. List; Sec. Lt. H. P. Reid, Spec. Res., Dec. 16th, 1916. Sec. Lt. R. J. Stubington, Hamps. R., T.F., Dec. 17th, 1916. Sec. Lt. (temp. Lt.) E. R. H. Beaman, Home Counties Divl. Engrs, R.E., T.F., Dec. 18th, 1916. Temp. Sec. Lt. (temp. Capt.) C. G. Eccles, R. W. Kent R., to relinquish the rank of temp. Capt., and to be transfd. to Gen. List. Lt. E. E. H. Hamilton Jackson, Suff. R., Spec. Res., and to be secd.; Temp. Lt. E. L. Heyworth, Manch. R., and to be transfd. to Gen. List; Sec. Lt. L. H. Gibbon, Spec. Res.; Temp. Sec. Lt. R. M. Marsh, Gen. List, Dec. 19th, 1916.

Balloon Officers.—Sec. Lt. (on prob.) H. D. Pashley, Spec. Res. (Since deceased); Temp. Sec. Lt. W. H. Scanlan, Gen. List; Temp. Sec. Lt. A. D. Mackay, attd. Arg. and Suth'd Highrs.; Temp. Sec. Lt. W. J. G. Armiger, Gen. List; Sec. Lt. (on prob.) E. Blore, S. Wales Bord., Spec. Res., and to be secd., Nov. 7th, 1916. Lt. P. H Drury, S. Wales Bord., and to be secd.; Sec. Lt. A. S. A. Herne, Midd'x R., T.F., Nov. 1st, 1916. Sec. Lt. (temp. Capt.) R. M. A. Edlundh, Lond. R., T.F.; Temp. Sec. Lt. S. Jennings, York R., and to be transfd. to Gen List; Sec. Lt. R. I. Page, R. Fus., Spec. Res., and to be secd., Nov. 22nd, 1916. Lt. J. K. T. Glen, High. L.I., T.F.; Temp. Lt. V. D. Drury, R.E., Nov. 27th, 1916. Temp. Sec. Lt. H. H. T. Potter, Gen. List, Dec. 17th, 1916. Sec. Lt. A. E. B. Craddock, Arg. and Suth'd Highrs., T.F., Dec. 19th, 1916.

Equipment Officers, 2nd Cl.—Lt. R. K. Pillers, North'n R., Spec. Res., from the 3rd Cl., Dec. 22nd, 1916.

Equipment Officer, 3rd Cl.—Temp. Sec. Lt. E. T. Driver, Gen. List, Oct. 2nd, 1916. (Substituted for the notification in the "Gazette" of Dec. 19th, 1916.)

School of Aerial Gunnery.—The appointment of Lt. (temp. Major) H. E. Chaney, Lan. Fus., as a Chief Instructor, notified in the "Gazette" of Oct. 18th, 1916, is antedated to Sept. 1st, 1916, without the pay and allowances of that appointment prior to Sept 13th, 1916.

Memorandum.—To be temp. Sec. Lt. (on prob.)—Cpl. H. A. Thomas, from R.F.C., for duty with the Mil. Wing of that Corps, Dec. 18th, 1916.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—W. R. S Humphreys, from Lt., 5th Canadian Inf., to be Lt., Jan. 11th.

* * *

Supplement to the "London Gazette," Jan. 10th, 1917.

War Office, Jan. 10th.

The King has been pleased to approve of the appointments of the following officers to be Companions of the Distinguished Service Order in recognition of their gallantry and devotion to duty in the Field:—

Sec. Lt. Norman Brearley, M.C., L'pool R. and R.F.C.

With another pilot he gallantly attacked seven hostile machines. Later, although severely wounded, he displayed great courage and determination in reaching our own lines.

Capt. George Alec Parker, M.C., North'n R. and R.F.C.

He attacked hostile aeroplanes on three occasions during the same flight, killing an enemy observer. On another occasion he drove off three enemy machines, pursuing one of them down to 750 ft. three miles behind the enemy's lines.

* * *

The King has been pleased to confer the Military Cross on the following officers in recognition of their gallantry and devotion to duty in the Field:—

Temp. Sec. Lt. William George Barker, Gen. List and R.F.C.

He flew at a height of 500 ft. over the enemy's lines, and brought back most valuable information. On another occasion, after driving off two hostile machines, he carried out an excellent photographic reconnaissance.

Lt. (temp. Capt.) John A. G. De Courcy, R.G.A. and R.F.C.

For conspicuous gallantry in action. He has located numerous hostile batteries, and by directing the fire of our howitzers has been instrumental in destroying a number of them. On one occasion he drove off three hostile machines.

Lt. (temp. Capt.) Charles Herbert Dixon, York. L.I., Spec. Res. and R.F.C.

He deliberately made himself a bait for a hostile machine, thereby enabling two of our machines to approach unseen and shoot down the enemy machine. He has carried out many bombing raids with great courage and success.

Temp. Lt. Arnold Lawson Harrow-Bunn, Notts and Derby R.

He displayed great courage and determination when acting as observer to his pilot, and brought down a hostile machine. He has on many previous occasions done fine work.

Capt. Guy Murton Moore, R. Berks R. and R.F.C.

He brought in much valuable information, by flying at 500 feet over the enemy's trenches. On another occasion he engaged enemy troops with his machine-gun and scattered them.

Capt. George Alec Parker, D.S.O., North'n R. and R.F.C.

He attacked a hostile scout machine and forced it to land after a long combat. He displayed great courage and skill in out-manœuvring this machine.

Sec. Lt. (temp. Capt.) William Gordon Pender, Spec. Res., R.F.C.

On three occasions he flew over the enemy's trenches for long periods at a height of 500 ft., enabling his observer to gain valuable information.

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Temp. Lt. (temp. Capt.) Charles F. A. Portal, R.E., Spec. Res. and R.F.C.

For conspicuous gallantry in action. He has done excellent artillery work in the air, often in bad weather, and at low altitudes; he has always set his flight the best of examples. On one occasion he shot down a hostile machine.

Sec. Lt. (temp. Lt.) William Hervey Allen Whitworth, Dorset R. and R.F.C.

He has carried out a great deal of artillery observation in the face of severe attacks from hostile machines. On one occasion he fought two hostile aircraft for 10 minutes until another machine came to his rescue.

Canadian Force.

Lt. Frederick George Herbert Manville, Can. Inf. and R.F.C.

He has done exceptionally brilliant work, often under most difficult conditions. On one occasion he flew for three hours at a low altitude far over the lines, ranging on active enemy batteries.

* * *

The following have been awarded a Bar to their Military Cross for subsequent acts of conspicuous gallantry:—

Sec. Lt. (temp. Lt.) Alan Duncan Bell-Irving, M.C., Gord. Highrs., Spec. Res. and R.F.C.

He displayed great courage and skill when escorting a bombing raid. He engaged several enemy machines and drove them off. Afterwards, although his own machine was damaged, he continued to fight against superior numbers of the enemy. (Military Cross awarded in "Gazette" dated Oct. 20th, 1916.)

Sec. Lt. Hamilton Elliot Hervey, M.C., Gen. List and R.F.C.

He displayed great courage and skill on several occasions as machine gunner, and materially assisted in several successful flights. (Military Cross awarded in "Gazette" of this date.)

* * *

From the "London Gazette" Supplement, Jan. 11th, 1917.

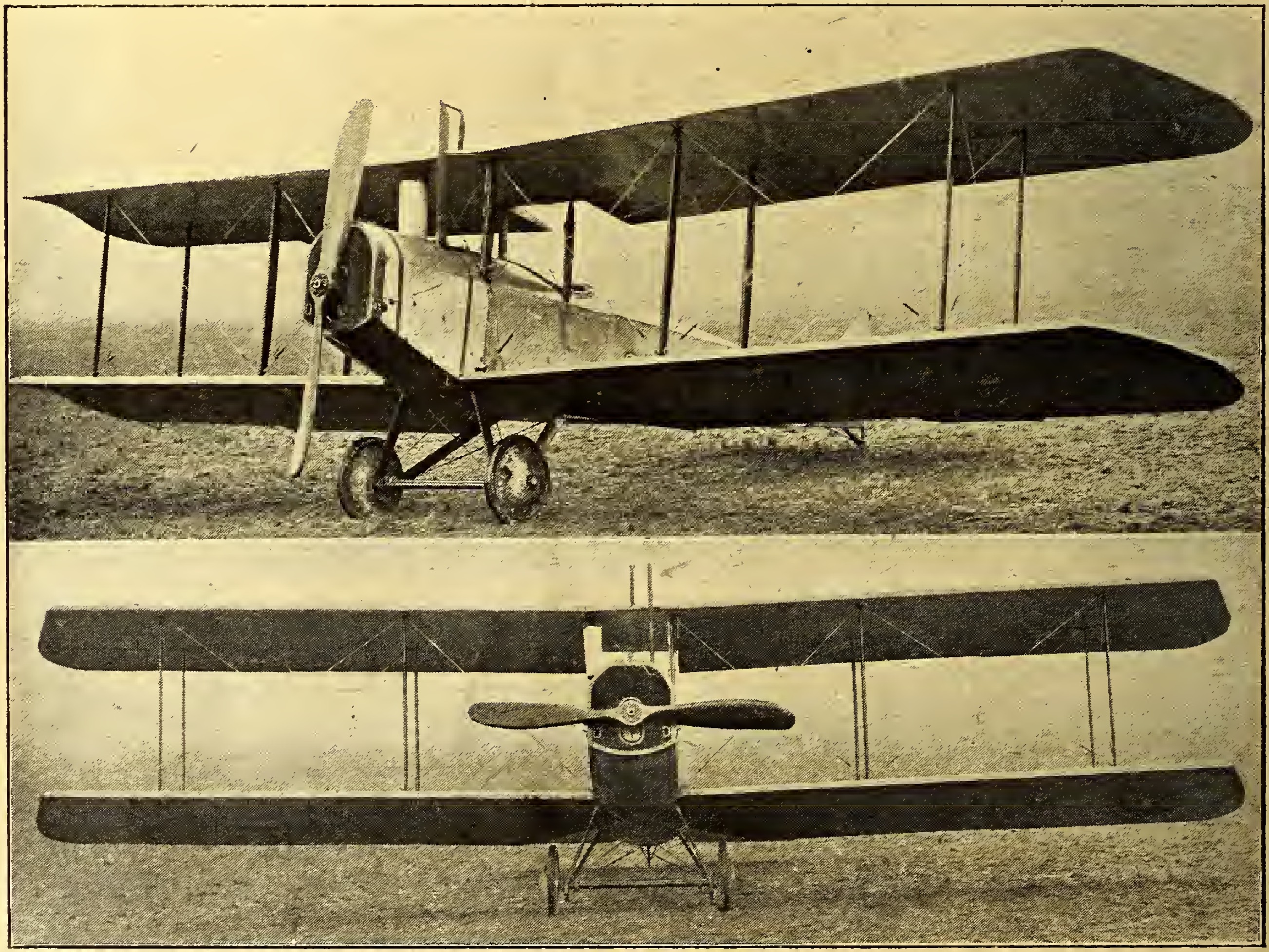
War Office, Jan. 11th.

REGULAR FORCES.—Staff.—The following temp. appointment is made at the War Office:—Staff Lt.: Sec. Lt. T. G. Leith, R.F.C., Spec. Res., from an Equipment Officer, 3rd Cl., vice Lt. St. J. R. Piggott, Ir. Gds.

Establishments.—R.F.C.—Wing Comdr.—Lt. (temp. Major) G. F. Pretyman, D.S.O., Som. L.I., from a Sqdn. Comdr., and to be temp. Lt.-Col. whilst so employed, Dec. 28th, 1916.

Flight Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed:—Sec. Lt. A. F. Brooke, 10th Hrs., Nov. 7th, 1916. Sec. Lt. P. Huskinson, M.C., Notts and Derby R., Dec. 19th, 1916 Sec. Lt. (temp. Lt.) S. P. Smith, Wessex Divl. Train, A.S.C., T.F. Lt. J. G. Selby, R.A.; Lt. R. J. Lowcock, Notts and Derby R.; Capt. C. E. Bryant, D.S.O., 7th Hrs., from a Flying Officer. From Flying Officers, and to be temp. Capts. whilst so employed: Temp. Lt. A. Duguid, Gen. List; Temp. Sec. Lt. S. S. Halse, Gen. List, Dec. 22nd, 1916. Lt. (temp. Capt.) L. P. Aizlewood, M.C., York and Lanc. R., T.F., from a Flying Officer, Dec. 24th, 1916. From Flying Officers and to be temp. Capts. whilst so employed:—Temp. Sec. Lt. C. E. W. Foster, Gen. List, Dec. 26th, 1916. Temp. Sec. Lt. (temp. Lt.) G. B. A. Baker, Gen. List; Lt. H. E. Hartney, Canadian Local Forces; Temp. Capt. R. N. Thomas, Gen. List, from a Flying Officer; from Flying Officers and to be temp. Capts. whilst so employed: Sec. Lt. C. Holland, Spec. Res.; Temp. Sec. Lt. C. J. W. Crichton, Gen. List, Dec. 27th, 1916; Lt. F. V. Woodman, Canadian Gen. List, Dec. 28th, 1916. Sec. Lt. C. H. C. Woollven, M.C., Devon R., Dec. 31st, 1916. Sec. Lt. G. T. H. Hill, M.C., Spec. Res.; Sec. Lt. W. H. Hubbard, Spec. Res., Jan. 1st.

Flying Officers.—Capt. E. V. Andreini, Beds R., T.F., Nov. 5th, 1916. Sec. Lt. (temp. Lt.) J. L. Vachell, Welsh Brig., R.F.A., T.F.; Sec. Lt. N. J. Wenger, Staffs Yeo., T.F.; Sec. Lt. G. F. Welch, Ind. Army Res. of Officers, Nov. 27th, 1916. Sec. Lt. (temp. Lt.) A. J. Lazarus-Barlow, R.E., Kent Yeo., T.F.; Lt. G. E. C. Collinson, Cam'n Highrs., Spec. Res., and to be secd., Nov. 28th, 1916; Sec. Lt. J. Hutcheson, Sco. Rif., Spec. Res., from attd. R. Ir. R.; Sec. Lt. J. L. Toyne, Dorset R., Spec. Res., and to be secd.; Sec. Lt. J. S. Harvey, R. Dub. Fus., Spec. Res., and to be secd.; Temp. Sec. Lt. F. J. Gibbs, attd. S. Staffs R., Nov 29th, 1916. Capt. F. Wyatt, Suff. R., T.F.; Temp. Sec. Lt. A. H. C. A. Rawson, attd. R. War. R., Nov. 30th, 1916. Lt. W. P. Garnett, R. Berks R., Spec. Res., and to be secd., Dec. 16th, 1916. Temp. Sec. Lt. M. Dodd, L'pool R., and to be transfd. to Gen. List, Dec. 17th, 1916. Temp. Lt. H. M. Ayres, attd. Midd'x R.; Temp. Sec. Lt. C. H. Bird, Welsh R., and to be transfd. to Gen. List; Temp. Sec. Lt.



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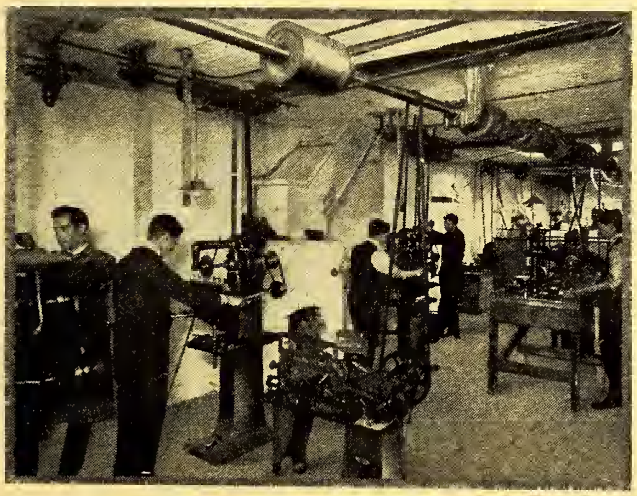

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CONTRACTORS TO THE ADMIRALTY AND WAR OFFICE.

J. W. Eyton-Lloyd, Gen. List, Dec. 19th, 1916. Lt. M. Halligan, R. Dub. Fus., and to be secd., Dec. 29th, 1916. Sec. Lt. C. W. Odell, R. Innis. Fus., and to be secd., Dec. 21st, 1916. Lt. G. E. W. Hitchcock, R.E., Spec. Res., Dec. 22nd, 1916. Sec. Lt. (temp. Capt.) E. Fletcher, N. Mid. Divl. Train, A.S.C., T.F., Dec. 23rd, 1916. Sec. Lt. (on prob.) F. A. Smith, Spec. Res., Dec. 24th, 1916. Temp. Sec. Lt. A. R. C. Cooper, Rif. Brig., and to be transfd. to Gen. List, Dec. 25th, 1916. Temp. Sec. Lt. T. Shepard, attd. R. War. R.; Sec. Lt. (on prob.) E. D. MacKay, Spec. Res., Dec. 28th, 1916.

Balloon Officers.—Sec. Lt. L. W. Thompson, Midd'x R., T.F., Temp. Sec. Lt. J. H. Jenkinson, R.W. Fus., and to be transfd. to Gen. List; Temp. Sec. Lt. C. W. M. Whitlock, Wilts R., and to be transfd. to Gen. List; Temp. Sec. Lt. H. P. D'O. Hills, attd. K.O. Sco. Bord.; Sec. Lt. A. Rowbottom, Bord. R., T.F.; Sec. Lt. A. T. Potter, Bord. R., T.F., Dec. 19th, 1916.

Equipment Officer, 2nd Cl.—Temp. Sec. Lt. D. P. Geddes, Gen. List, from the 3rd Cl., and to be temp. Lt. whilst so employed, Dec. 9th, 1916.

Equipment Officers, 3rd Cl.—Temp. Sec. Lt. (on prob.) E. Drudge, Gen. List, Oct. 26th, 1916. Lt. G. L. Godden, Spec. Res., from a Flying Officer, Nov. 14th, 1916. Sec. Lt. W. E. Nuttall, Spec. Res., Nov. 23rd, 1916. Sec. Lt. N. Martin, Spec. Res., Dec. 5th, 1916. Sec. Lt. W. H. G. Furnivall, Spec. Res.; Sec. Lt. A. G. Griggs, Spec. Res.; Temp. Sec. Lt. (on prob.) T. V. Brake, Gen. List; Temp. Sec. Lt. (on prob.) G. Lacey, Gen. List; Sec. Lt. (on prob.) B. V. N. Rowcroft, Spec. Res.; Sec. Lt. (on prob.) F. H. Tyas, Spec. Res., Dec. 6th, 1916. Sec. Lt. S. Blackley, Spec. Res., Dec. 9th, 1916. Sec. Lt. J. G. Wilson, Spec. Res., Dec. 13th, 1916. Sec. Lt. J. G. Hope, Spec. Res., Dec. 14th, 1916. Sec. Lt. (on prob.) H. D. Lehmann, Spec. Res., Dec. 16th, 1916. Temp. Sec. Lt. (on prob.) E. M. Cashmore, Gen. List; Sec. Lt. A. M. Saywood, Dec. 22nd, 1916.

Memorandum.—Sub. Lt. F. H. V. Wise, from R.N.V.R., to be temp. Lt. on Gen List for duty with R.F.C., Nov. 16th, 1916.

From the "London Gazette," Jan. 12th, 1917.

War Office, Jan. 12th.

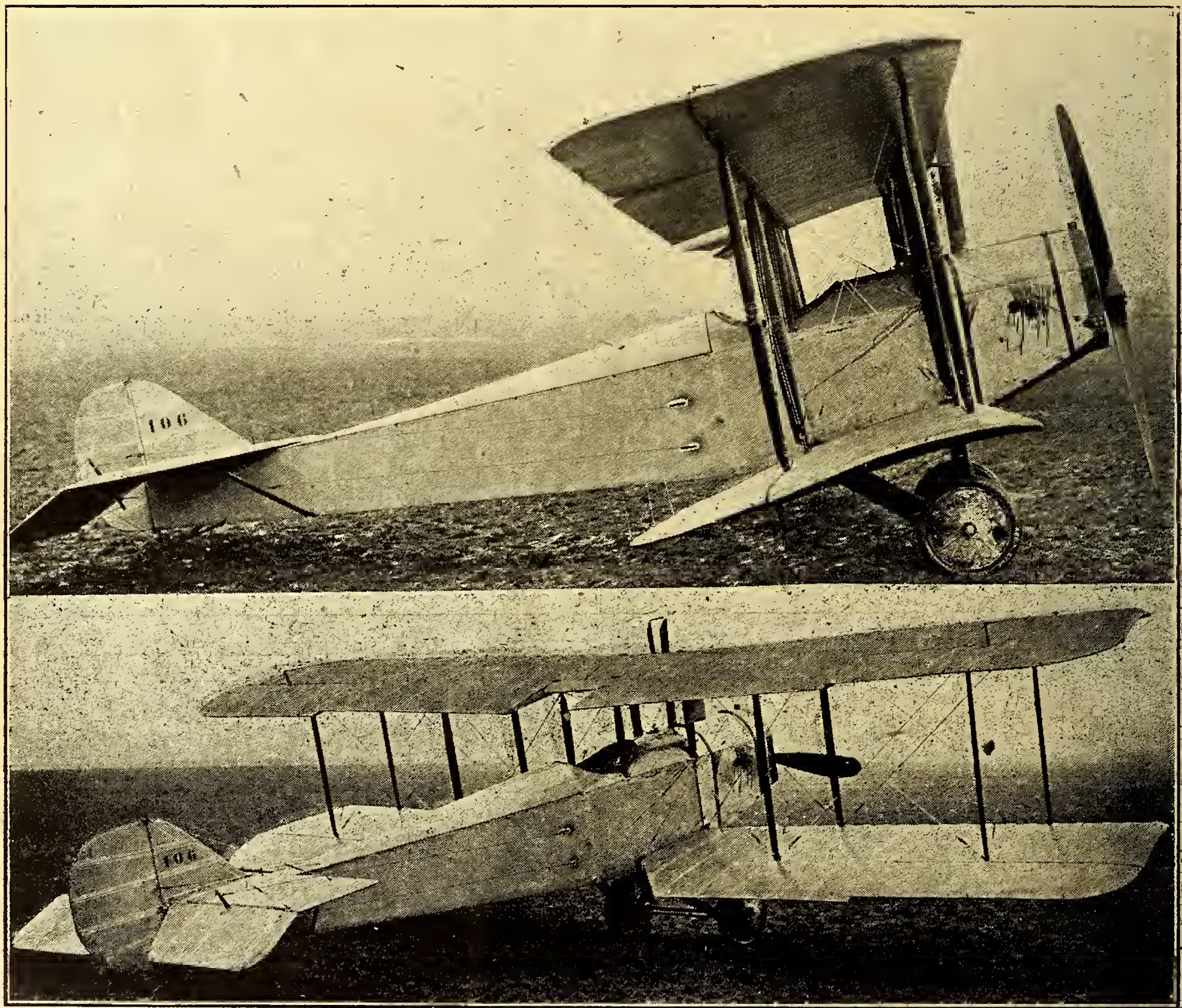
The undermentioned N.C.O's. and men to be temp. Sec. Lts. (on prob.) for service in the Field.

Memoranda.—For duty with R.F.C.—Cpl. H. A. Johnson, from R.E., T.F., Nov. 22nd, 1916. Cpl. D. H. Simmons, from R.F.C., Dec. 10th, 1916. Sgt. C. L. Mitchell, from Midd'x R., Pte. H. A. Dyer, from A.S.C., Dec. 11th, 1916. Sgt. L. C. F. Clutterbuck, from Mach. Gun Corps; Sgt. F. G. Taylor, from H.A.C., T.F.; Pte. W. A. C. Allen, from R.A.M.C., Dec. 16th, 1916. Sgt. H. Brown, from R.F.C., Dec. 18th, 1916.

REGULAR FORCES.—Staff.—The following temp. appointment is made at the War Office:—

Staff Lt.—From Equipment Officer, 3rd Cl.—Sec. Lt. F. B. Burton, R.F.C., Spec. Res., vice Sec. Lt. C. H. Whittington, R.F.C., Spec. Res., Dec. 14th, 1916.

R.F.C.—Flying Officers.—Sec. Lt. (on prob.) H. E. Duncan, Spec. Res., Dec. 13th, 1916. Temp. Lt. P. T. Newling, Gen. List; Sec. Lt. N. C. Saward, N. Mid. Brig., R.F.A., T.F.; Sec. Lt. G. Gibbons, Lond. R., T.F.; Temp. Sec. Lt. D. F. Cox, Gen List, Dec. 23rd, 1916. Lt. E. Gribben, R. Ir. Rif., Spec. Res., and to be secd.; Capt. J. G. Archdale-Porter, D.S.O., 9th Lrs., and to remain secd.; Sec. Lt. J. A. D. Wallis, Lond. R., T.F.; Temp. Sec. Lt. G. O. Venn, Gen. List; Sec. Lt. F. Bower, North'd Fus., and to be secd.; Temp. Sec. Lt. J. G. Kidd, Gen List, from attd. 36th Jacob's Horse, Ind. Army, Dec. 24th, 1916; Sec. Lt. O. T. Walton, S. Lan. R., Spec. Res., and to be secd.; Sec. Lt. R. J. Cullen, R. Highrs, T.F.; Sec. Lt. L. B. Blaxland, Spec. Res.; Lt. W. E. Molesworth, R. Muns. Fus., and to be secd.; Temp. Sec. Lt. P. F. Fullard, Gen. List; Sec. Lt. H. S. Brackenbury, Spec. Res.; Temp. Sec. Lt. T. V. Villiers, Gen. List, Dec. 26th, 1916. Temp. Sec. Lt. T. M. O'Neill, R. Dub. Fus., and to be transfd. to Gen. List; Sec. Lt. F. St. V. Morris, Notts and Derby R., Spec. Res., and to



A NEW BEATTY MACHINE:—Side and three-quarter back views of the Beatty School biplane. It should be noted that the exhaust pipe projecting over the top plane and the pitot tube apparently behind it, are not in the same vertical plane.

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be secd.; Temp. Sec. Lt. (on prob.) C. G. Turpin, R. Fus.; Temp. Sec. Lt. (on prob.) D. A. Page, attd. Ches. R., Dec. 27th, 1916.

Equipment Officer, 1st Cl.—Lt. E. I. Bingham, Spec. Res., from 3rd Cl., and to be temp. Capt. while so employed, Dec. 21st, 1916.

Equipment Officers, 3rd Cl.—Sec. Lt. A. E. Fincher-Brookes, Spec. Res., July 8th, 1916. Temp. Sec. Lt. (on prob.) T. E. Pennington, Gen. List, Dec. 22nd, 1916.

Experimental Officer, 1st Cl. (graded as an Equipment Officer, 1st Cl.).—Capt. H. R. Raikes, E. Kent. R., Spec. Res., from a Flying Officer, Dec. 15th, 1916.

Experimental Officer, 3rd Cl. (graded as an Equipment Officer, 3rd Cl.).—Sec. Lt. A. Glynne, Spec. Res., Jan. 1st.

Memoranda.—To be temp. Lts. for duty with R.F.C.—Temp. Sec. Lt. G. R. Simpson, Sec. Lt. C. G. Holman, K.O.S.B. Temp. Sec. Lts.:—A. Broomer, H. E. Bagot, R. M. Collingwood, K. M. St. C. G. Leask, J. S. Webb, D.C.L.I., T. H. Trew, R. M. Hill, M.C., L. S. Weedon, V. C. Roberts, North'd Fus., A. V. Shewell, Glouc. R., R. Robertson, C. L. Blake, H. G. Bellamy, R. J. E. P. Goode, R. Ir. Fus., R. D. Elliott, Shrops L.I., W. U. P. Powell, E. York R., H. G. Bowen, A. T. Hope, G. A. P. Upston, Oct. 1st, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. H. Baynes is dismissed the Service by sentence of a General Court-martial, Dec. 7th, 1916.

Sec. Lts. (on prob.) are confirmed in their rank:—A. E. Fincher Brookes, H. S. Brackenbury, L. B. Blaxland, F. H. Tyas, B. V. N. Rowcroft, H. D. Pashley, A. Glynne.

To be Sec. Lts. (on prob.):—W. Sillem, Oct. 23rd, 1916. L. Crooks, Nov. 21st, 1916. D. E. Barnet, Nov. 22nd, 1916. A. W. Gillespie, F. A. Woolfe, Nov. 27th, 1916. E. S. Crabtree, Dec. 2nd, 1916. H. B. Lilley, Dec. 11th, 1916.

The appointment of Sec. Lt. (on prob.) R. S. G. MacLean, notified in "Gazette" of Dec. 7th, 1916, is antedated to Oct. 18th, 1916.

The appointment of Sec. Lt. P. R. Aitken, notified in "Gazette" of Nov. 15th, 1916, is antedated to Oct. 24th, 1916.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. F. W. Nisbet is secd. for duty with the R.F.C., Dec. 15th, 1916.

Infantry.—R. W. Surrey R.—Sec. Lt. R. H. Upson is secd. for duty with the R.F.C., Dec. 30th, 1916.

A.S.C.—Lt. G. C. Walker is now secd. for duty with the R.F.C., Dec. 15th, 1916.

Sec. Lt. (temp. Capt.) E. Fletcher is now secd. for duty with the R.F.C., Dec. 23rd, 1916.

* * *

From the "London Gazette" Supplement, Jan. 13th, 1917.

REGULAR FORCES. — Establishments.—R.F.C.—Flying Officers.—Temp. Lt. F. H. V. Wise, Gen. List, Nov. 16th, 1916. Temp. Sec. Lt. (on prob.) W. H. Jones, Gen. List, Dec. 8th, 1916. Sec. Lt. (on prob.) R. Hunt, Spec. Res., Dec. 9th, 1916. Sec. Lt. A. E. Boultbee, Northn. R., Spec. Res., and to be secd., Dec. 12th, 1916. Temp. Sec Lt. A. Morrison, Gen. List, Dec. 13th, 1916. Dec. 15th, 1916: Temp. Lt. B. Evans, Middx. R., and to be transfd. to Gen. List; Lt. C. L. Graves, 25th Canadian Inf. Bn.; Sec. Lt. H. B. T. Hope, Northn. R., T.F.

Special Appointments.—Graded as Park Comdrs.—Qmr. and Hon. Lt. (temp. Capt.) J. H. Wilford, R.F.C., from an Equipment Officer, 1st Cl., and to be temp. Maj. whilst so empld., Oct. 10th, 1916. (Substituted for the notification in the "Gazette" of Dec. 28th, 1916.)

From Equipment Officers, 1st Cl.—Dec. 21st, 1916: Capt. (temp. Maj.) C. D. M. Campbell, Spec. Res., and to retain his temp. rank whilst so empld.; Lt. (temp. Capt.) G. P. Grenfell, Spec. Res., and to be temp. Maj. whilst so empld.

Memoranda.—The undermentioned temp. Sec. Lts. to be temp. Lts. for duty with R.F.C., Oct. 31st, 1916: R. Stephenson, E. V. Pemberton, H. Brereton, A. N. Nesbitt, J. Kerr, J. B. Graham, N. F. W. Rockey. C. H. B. Readman, F. L. Barnard, J. H. Crutch, L. Reynolds, H. Harris, R. Lanc. R. (attd.): J. R. Orrell, Manch. R.; L. C. Burcher, W. A. Dunn, F. D. Jackson, C. E. Maslin, Bedf. R.; W. F. Findlay, W. M. Fry.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—The undermentioned Sec. Lts. (on prob.) are confirmed in their rank: H. E. Duncan, F. A. Smith, E. D. Mackay.

The Christian names of Sec. Lt. Frederick Harvey Cooper O'Beirne are as now described, and not as in the "Gazette" of May 1st, 1916.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. W. H. K. Copeland is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916. Sec. Lt. A. G. Taylor is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

Sec. Lt. F. H. Creasy is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

R.F.A.—Sec. Lt. T. Q. Back is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916. Sec Lt. D. Clark is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

Sec. Lt. T. G. Brown is seconded for duty with the R.F.C., Dec. 15th, 1916.

Sec. Lt. T. M. Southorn is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916. Sec. Lt. D. J. Horner is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

R.G.A.—Sec. Lt. (temp. Lt.) W. G. Cleghorn is seconded for duty with the R.F.C., Nov. 1st, 1916. Sec. Lt. W. M. Turner is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

Sec. Lt. W. W. Sawden is granted the temp. rank of Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

R.E.—Sec. Lt. G. Vaughan-Jones is granted the temp. rank of Lt. whilst with the R.F.C., Dec. 1st, 1916.

Lt. H. Vitty is seconded for duty with the R.F.C., Dec. 1st, 1916.

Infantry.—Royal West Surrey Regt.—Sec. Lt. O. R. Knight to be temp. Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

Leicestershire Regt.—Sec. Lt. H. A. Evans (a T.F. Bn. Lincoln Regt.) is now seconded for duty with the R.F.C., Nov. 25th, 1916.

East Lancashire Regt.—Sec. Lt. C. Parkinson to be temp. Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

Border Regt.—Sec. Lt. A. T. Potter is seconded for duty with the R.F.C., Dec. 19th, 1916. Sec. Lt. A. Rowbottom is seconded for duty with the R.F.C., Dec. 19th, 1916.

Hampshire Regt.—Sec. Lt. G. F. Randall to be temp. Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

Royal Highlanders.—Sec. Lt. R. J. Cullen is seconded for duty with the R.F.C., Dec. 26th, 1916.

Essex Regt.—Sec. Lt. F. O. Rose is seconded for duty with the R.F.C., Nov. 17th, 1916.

Argyll and Sutherland Highlanders.—Sec. Lt. D. S. Hall to be temp. Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

London Regt.—Sec. Lt. G. F. Bishop to be temp. Lt. whilst serving with the R.F.C., Dec. 1st, 1916. Lt. L. P. Prior is seconded for duty with the R.F.C., Dec. 16th, 1916. Sec. Lt. H. A. Cooper to be temp. Lt. whilst serving with the R.F.C., Dec. 1st, 1916. Sec. Lt. J. A. D. Wallis is seconded for duty with the R.F.C., Dec. 24th, 1916.

Northamptonshire Regt.—Sec. Lt. H. B. T. Hope is seconded for duty with the R.F.C., Dec. 15th, 1916.

Middlesex Regt.—Sec. Lt. L. W. Thompson is seconded for duty with the R.F.C., Dec. 19th, 1916. Sec. Lt. J. B. Fenton to be temp. Lt. whilst serving with the R.F.C., Dec 1st, 1916.

Durham L.I.—Sec. Lt. C. B. Riddle to be temp. Lt. whilst serving with the R.F.C., Dec. 1st, 1916.

* * *

From the "London Gazette" Supplement, Jan. 15th, 1917.

War Office, Jan. 15th.

REGULAR FORCES.—R.F.C.—Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so empld.:—Sec. Lt. (temp. Capt.) G. O. Brunwin-Hales, Essex R., T.F., Dec. 22nd, 1916. Temp. Sec. Lt. C. M. Clement, Gen. List, Dec. 26th, 1916.

Adjts.—Capt. E. F. Campbell, K.R.R.C., from a Balloon Officer, Dec. 11th, 1916. Capt. A. J. R. Waller, Essex R., and to be secd., Dec. 14th, 1916. Lt. J. J. Breen, R. Ir. R., from a Flying Officer, vice Lt. (temp. Capt.) C. S. McNab, Cam'n. Highrs., Dec. 16th, 1916.

Equipment Officer, 3rd Cl.—Lt. F. G. Brown, Lowland Brig., R.F.A., T.F., Dec. 15th, 1916.

Infantry.—Midd'x. R.—Temp. Sec. Lt. R. L. Turnell, from Gen. List, R.F.C., to be temp. Sec. Lt. (attd.), Jan. 16th, seny. from July 7th, 1916.

Manch. R.—Temp. Sec. Lt. G. S. Thwaits, from Gen. List, R.F.C., to be temp. Sec. Lt. (attd.), Jan. 16th, seny. from July 7th, 1916.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. O. C. Bryson is secd. for duty with the R.F.C., Dec. 26th, 1916.

Sec. Lt. E. St. T. W. Freer is secd. for duty with the R.F.C., Dec. 28th, 1916.

R.G.A.—Maj. W. C. Whiskin is secd. for duty with the Anti-Aircraft Depot, Dec. 30th, 1916.

Infantry.—Argyll and Suth'd. Highrs.—Sec. Lt. A. E. B. Craddock is secd. for duty with the R.F.C., Dec. 19th, 1916.

NAVAL.

The following appointments have been made in the R.N.A.S.:—

Jan. 10th.—Sub-Lieut. (temp., R.N.V.R.).—K. C. Tilman, entered as a Prob. Flt. Officer (temp.), seny. Dec. 31st, 1916, and appointed to "President," addl., for duty with R.N.A.S. temp. commission as Sub-Lt., R.N.V.R., terminated).

The undermentioned have been entered as Prob. Flt. Officers (temp.), seny. as follows, and all appointed to "President," addl., for duty with R.N.A.S.:—R. E. Carroll, Nov. 10th; T. C. May, Nov. 21st; E. S. Campbell, Nov. 22nd; T. L. Glas-

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gow, Dec. 7th; W. H. Comstock, G. M. K. Calder, D. M. Briden, F. J. Mackie, S. St. James, R. K. M'Arthur, and H. B. Kerruish, all Dec. 14th.

Jan. 11th.—Mr. C. B. Hull, granted a temp. commn. as Sub-Lt. (R.N.V.R.), seny. Jan. 9th, and apptd. to "President," addl., for R.N.A.S.

Jan. 16th.—The following Sub-Lts. (Temp.), R.N.V.R., have been entered as Proby. Flt. Officers (Temp.), seny. Jan. 27th:—J. T. Sims, H. J. Roach, J. Hodson, A. M. Tidey, F. E. Fraser, H. C. Lemon, and A. T. Barker.

Mr. W. J. F. Dutson, granted temporary commission as Sub-Lt., seny. Jan. 13th.

Admiralty Communiqué.

Jan. 12th.—His Majesty's seaplane carrier "Ben-My-Chree" (Wing-Commander C. R. Samson, D.S.O.) was sunk by gunfire in Kastelorizo Harbour (Asia Minor) on Jan. 11th. The only casualties were one officer and four men wounded.

The Casualty List.

Reported Jan. 10th.

Missing.—Higby, W. W., Air Mech., 1st Grade, F.8940.
Kennedy, D., Ldg. Mech., F.1866.
Wright, F. A., Ldg. Mech., F.9197.

[These men were apparently passengers with Flt. Lt. Vereker, and Lt. Hibbard, when the Handley-Page biplane took the wrong turning.—Ed.]

Reported Jan. 12th.

Killed.—Bridgeman, Comdr. the Hon. Richard O. B., D.S.O., R.N.
Moon, Flt. Comdr. Edwin R., R.N.
Wounded.—Grange, Flt. Lt. Edward R., R.N.
Lawson, Flt. Sub-Lt. Alfred H. S., R.N.
Slightly Injured.—Williams, Flt. Lt. Walter T. S., R.N.
De Wilde, Mr. Henry R., Flt. Officer, R.N.
Previously reported Missing, now reported a Prisoner.—Cooper, Flt. Lt. Edward J., R.N.

Reported Jan. 15th.

Accidentally Injured.—Proby. Flt. Sub-Lt. Leslie J. N. Mackay, R.N.

PERSONAL NOTICES.

Deaths.

BRIDGEMAN.—The announcement is made that Commander the Hon. Richard Orlando Beaconsfield Bridgeman, R.N., D.S.O., has been killed, while flying, in the campaign in East Africa. He was a younger brother of the present Earl of Bradford, who is himself serving at the Front, as is also their remaining brother, Major H. G. O. Bridgeman, R.H.A. Commander Bridgeman was appointed Flag Commander to the Commander-in-Chief on the Cape station in June, 1914, and has taken part in all the naval operations on the East African coast.

He received the D.S.O. for gallant conduct on the occasion of the attack on Tanga Harbour, and also took part in the destruction of the German cruiser "Königsberg," when he had a narrow escape, a bullet passing through his cap. The gallant officer had, besides, taken part in the military operations ashore, having acted as liaison officer between the Commander-in-Chief and General Smuts, and had also frequently acted as observer in aerial reconnaissances.

Commander Bridgeman was one of the Naval officers selected to accompany the King on his State visit to India for the Durbar, and commanded the naval guard of honour at Delhi. He had previously served on the China station and at the Cape during the South African War. Commander Bridgeman was a keen sportsman, a good shot, and a good rider to hounds, being well known in the Brocklesby country, where he spent some of his leave in the seasons before the war.

* * *

MOON.—News has been received of the death while flying in East Africa of Flight Commander E. R. Moon, R.N., eldest son of Mrs. Sims, of Houghton, Bassett, Southampton. He was born in 1886, and educated at Bannister's and Cranleigh Schools. On his father's death in 1906 he took over the management of his business, and subsequently started the Moonbeam Company at Southampton, for the making of motors, aeroplanes, seaplanes, and marine engines. When the war broke out he at once applied for a commission. For a considerable time he was stationed at Felixstowe, and about a year ago he was sent to East Africa. His promotion to Flight Commander was only gazetted on the 2nd inst.

Marriage.

RICE—GROVES.—On Jan. 6th, at St. Paul's, Wimbledon Park, S.W., Clarence Vivian Rice, R.N.A.S., eldest son of Mr. and Mrs. Augustus Percy Rice, of 23, Broomfield Avenue, Palmer's Green, N., was married to Marjorie Lyne Groves, eldest daughter of Mr. and Mrs. Herbert James Groves, of 105, Elborough Street, Southfields, S.W.

Engagements.

BIRKBECK—ELLIOT.—The marriage between Flt. Sub-Lt. M. Birkbeck, R.N., and Miss Lettice Elliot will take place at St. Barnabas, Pimlico, on Saturday, Feb. 3rd, at 2 p.m. There will be no reception, but all friends are invited to the church.

* * *

NEWBERRY—COWPER.—The wedding of Flt. Lieut. J. D. Newberry, R.N., second son of Mr. Charles Newberry, of Prinzberg, Clocolan, South Africa, and Mary Lethbridge (Mollie), second daughter of Mr. H. P. Cowper, late of the Brigalows, New South Wales, will shortly take place very quietly in Eastbourne.

* * *

OLIVER—GRANT-SUTTIE.—The marriage arranged between Sqdrn. Comdr. Douglas A. Oliver, D.S.O., R.N., only son of the Rev. Austin Oliver, and Sheila, daughter of the late Capt. Francis Grant-Suttie, R.N., and Mrs. Grant-Suttie, 3, Stafford Mansions, Buckingham Gate, will take place early this week.

* * *

WRIGHT—KNIGHT.—An engagement is announced between Flt. Officer Leslie Gordon Wright, R.N., second son of Mr. and Mrs. A. A. Wright, of Acton Hill, W., and Miss Maud May Knight, youngest daughter of Mr. and Mrs. W. A. Knight, of Bruton, Somerset.

The "Ben-My-Chree (2,550 tons) before being taken over by the Admiralty was in the Irish Channel service, making the fast trip between Liverpool and the Isle of Man.

The Liverpool correspondent of the "Morning Post" states that "the sinking of the 'Ben-My-Chree' came as a shock to Liverpool. She was the most popular pleasure steamer sailing out of the Mersey, besides being the fastest steamer sailing to the Isle of Man. Her fittings equalled those of many an Atlantic liner, and she had often been taken as such while lying in the Mersey."

The "Ben-My-Chree" was built in 1908 by Vickers at Barrow. She was a triple-screw turbine steamer, with a speed of 25 knots. Her accommodation was for 2,668 passengers and crew.

Kastelorizo is an island off the Asia Minor coast, to the east of Rhodes, mainly inhabited by Greeks. How the vessel came to be sunk by enemy gun-fire in the harbour appears to require more detailed explanation than the Admiralty has seen fit to give in the communiqué.

The operations at Kastelorizo, in which the "Ben-My-Chree" appears to have been taking part, have not been mentioned for some time in official communiqués. Over a year ago French detachments landed in the island in order to facilitate Allied action against Adalia. It was announced that the occupation was only provisional, but the position of the island in the bay made it valuable as a base, and, presumably, it has been used since for this purpose by the Allied squadrons.

All will be glad that Comdr. Samson and his officers and men have escaped without loss of life.

It will be remembered that after his early operations in Flanders, Comdr. Samson took a Wing of the R.N.A.S. to Gallipoli, where he and many of his Wing were mentioned in dispatches by Admiral de Robeck and General Sir Charles Monroe. Later, he was invalided home, and, on his recovery, he returned to the Eastern Mediterranean, where he took command of the "Ben-My-Chree." Dispatches from the Egyptian Command had previously mentioned this ship as a seaplane-carrier, commanded by Sqdrn. Comdr. (Acting Wing Comdr.) L'Estrange Malone, now Wing Comdr.

Curiously enough, Comdr. L'Estrange Malone was the first officer to fly an aeroplane off a moving ship—a feat performed while steaming up to Portsmouth, on H.M.S. "Hibernia"—just as Comdr. Samson was the first officer to fly off a ship at anchor—H.M.S. "Africa," in Sheerness Harbour.

* * *

On Jan. 11th Sir John Jellicoe, First Sea Lord, was presented with the Honorary Freedom of the Fishmongers' Company. Speaking at a luncheon which followed, on the work of the Navy, he made the following reference to the work of the R.N.A.S.:—

On the East Coast of Africa the naval forces, including our river gunboats, monitors, and aircraft, have rendered great service to our kinsmen from the Union of South Africa.

[One regrets that he did not say more about the aircraft on the East Coast of Great Britain.—Ed.]

MILITARY.

War Office Communiqué.

The General Officer Commanding British Forces in Macedonia reports Jan. 15th:—

A hostile aeroplane was brought down by the Royal Flying Corps near Lahana, the German pilot and observer being taken prisoner; the machine was undamaged. This is the fourth aeroplane brought down in the last three weeks.

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The Casualty List.

Reported Jan. 11th.

Previously reported Missing, now reported Killed.—Hayne, Sec. Lt. M., Lancs Fus., attd. R.F.C.

Lucas, Capt. Rt. Hon. A. T. Lord, Yeomanry and R.F.C.

Previously reported Missing, now reported Died of Wounds as a Prisoner in German Hands.—Pemberton, Capt. A. J. M., M.C., Leinster R., attd. R.F.C.

Previously reported Missing, now reported Prisoner in German Hands.—Blayney, Sec. Lt. B. W., R.F.C.

Indian Forces.—Previously reported Missing, now reported Killed.—Veitch, Capt. D. M. V., Indian Cavalry, attd. R.F.C.

Killed.—Newton, 31017 C. W., Cl. Air Mech. (Morley), R.F.C.

Wounded.—Halstead, 856 Flt. Sgt. G. W. (Hazelmere), R.F.C.

Reported Jan. 12th.

Killed.—Thomson, Lt. W. D., Canadian Inf., attd. R.F.C.

Previously reported Missing, now reported Killed.—Thierry, Sec. Lt. F. G., R.F.C.

Previously reported Missing, now reported Wounded and Prisoner in German Hands.—Bolton, Capt. A. C., R. Scots Fus., attd. R.F.C.

Reported Jan. 13th.

Killed.—Jameson, Sec. Lt. H., R.F.C.

Wounded.—Faure, Lt. D. M., R.F.C.

Reported Jan. 15th.

Killed—Lukis, Sec. Lt. L. C. F., Essex, attd. R.F.C.

Wounded.—James, Lt. W. F. T., Yeomanry and R.F.C.

Thompson, Lt. C. A. W., R.F.A., attd. R.F.C.

Missing.—Mann, Sec. Lt. F. A., Suffolk and R.F.C.

Parker, Maj. L., Hussars and R.F.C.

Wagner, Sec. Lt. E. G. S., R. Warwickshire and R.F.C.

Reported Jan. 16th.

Died of Wounds.—Bisset, Sec. Lt. E. G. W., Gordon Highrs. and R.F.C.

Previously reported Missing, now reported Prisoner in German Hands.—Black, Sec. Lt. W., Durham L.I. and R.F.C.

Missing, believed Prisoner.—Pocock, Sec. Lt. A. D., R.F.C.

Died.—R.F.C.—Hughes, 33125 2nd Cl. Air Mech. R. G. (Bedford-on-Avon).

PERSONAL NOTICES.

Deaths.

BISSET.—Sec. Lt. Edgar G. W. Bisset, Gordon Highlanders, attached R.F.C., died of wounds, was the second son of Mr. James Bisset, Union Bank, Peterhead, and was 20 years of age. He obtained his commission in December, 1915.

* * *

BURDON and TURNER.—An aeroplane came down in flames near Leeds at 11.0 a.m. on Jan. 10th. The pilot, Capt. R. Burdon, and the passenger, Lt. F. H. Turner, were both killed. While descending the machine caught a tree top, and, coming to earth, burst into flames. The air conditions were excellent for flying.

Capt. Burdon, R.F.C., was the only son of Rowland and M. A. Burdon, and was aged 23. The funeral was at Castle Eden, on Monday, Jan. 15th, at 2 p.m.

At Eton, in 1909, he won the junior long jump, high jump, 100 yards hurdles, and fives. He also obtained more points than anyone else for the Victor Ludorum Cup. According to the "Eton College Chronicle," "The cup was won by Harvey with 43 points, though Burdon obtained 47 points. The cup, however, is not open to juniors, but Burdon is to be congratulated on a very fine performance." In 1910 and 1911 he was keeper of the fives. In the latter year he won the hurdles, as well as the long jump (20 ft. 7½ in.). In 1910 and 1911 he was a member of "Pop."

In the last summer at Eton he played several times for the Eleven, but owing to a mishap to his knee he did not get his colours. Later in that year he went to University College, Oxford, where he took his degree in 1914.

At the outbreak of war he joined a battalion of the Durham L.I. which was raised by his father. He joined the R.F.C. in July, 1915. He served nine months at the front, and was invalided home in June, 1916. In December last he was appointed an instructor at the station where he was killed.

Lt. Frederick Harry Turner, M.C., R.F.C., whose death is recorded above, was the only son of Mr. and Mrs. Fred Turner, of Priory Road, High Wycombe. Born in 1896, he was educated at Wycombe Royal Grammar School and Queen's College, Taunton, and was a member of the O.T.C. at school, and one of the best shots in the corps. On the outbreak of war he joined the London University O.T.C., and in December, 1914, he was gazetted Sec. Lt. in the 10th Gloucestershire Regt. He went out to France in Aug., 1916, and was promoted Lieut. a month later. Mr. Turner took part in several engagements, and was awarded the Military Cross for his gallantry at the battle of Loos. He transferred to the R.F.C. a few months ago, and obtained his certificate as a pilot.

* * *

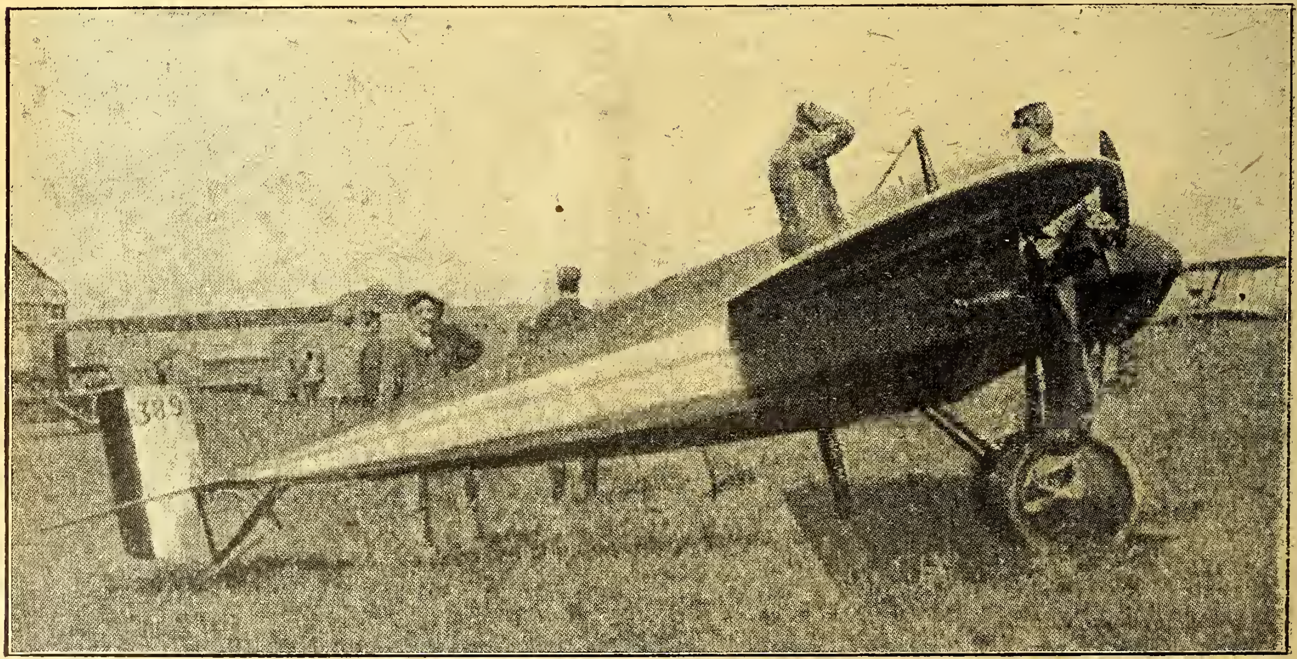
CLARK.—Lt. Eric F. Clark, the Buffs (East Kent Regt.), attached R.F.C., whose name appeared in the list of fallen officers published on Jan. 9th, was the elder son of Councillor G. Foster Clark, the Mayor of Maidstone. He was 20 years of age, and was educated at Mill Hill School.

* * *

FATT.—Lieut. William Maberley Fatt, Canadian Contingent, whose death was announced last week, saw nearly a year's service at the Front. The aeroplane accident occurred in England on the 4th inst. Mr. Fatt was in his 25th year, and was the eldest son of the Rev. F. H. Fatt, of Victoria, B.C. He came over with the Second Contingent of the Canadian Expeditionary Force, and had his lieutenant's commission in June, 1915.

* * *

FRENCH.—Sec. Lt. Thomas Hugo French was killed while flying in a snowstorm on Jan. 13th. He was an eye-witness of the accident which occurred in the same district five days earlier, and by which two of his brother officers, Capt. Burdon and Lt. Turner, lost their lives. Mr. French had flown the same machine on the previous Saturday, and in giving evidence at the inquest ascribed the accident as due to a slight error of judgment on the part of the pilot. He was the first on the scene of the accident.



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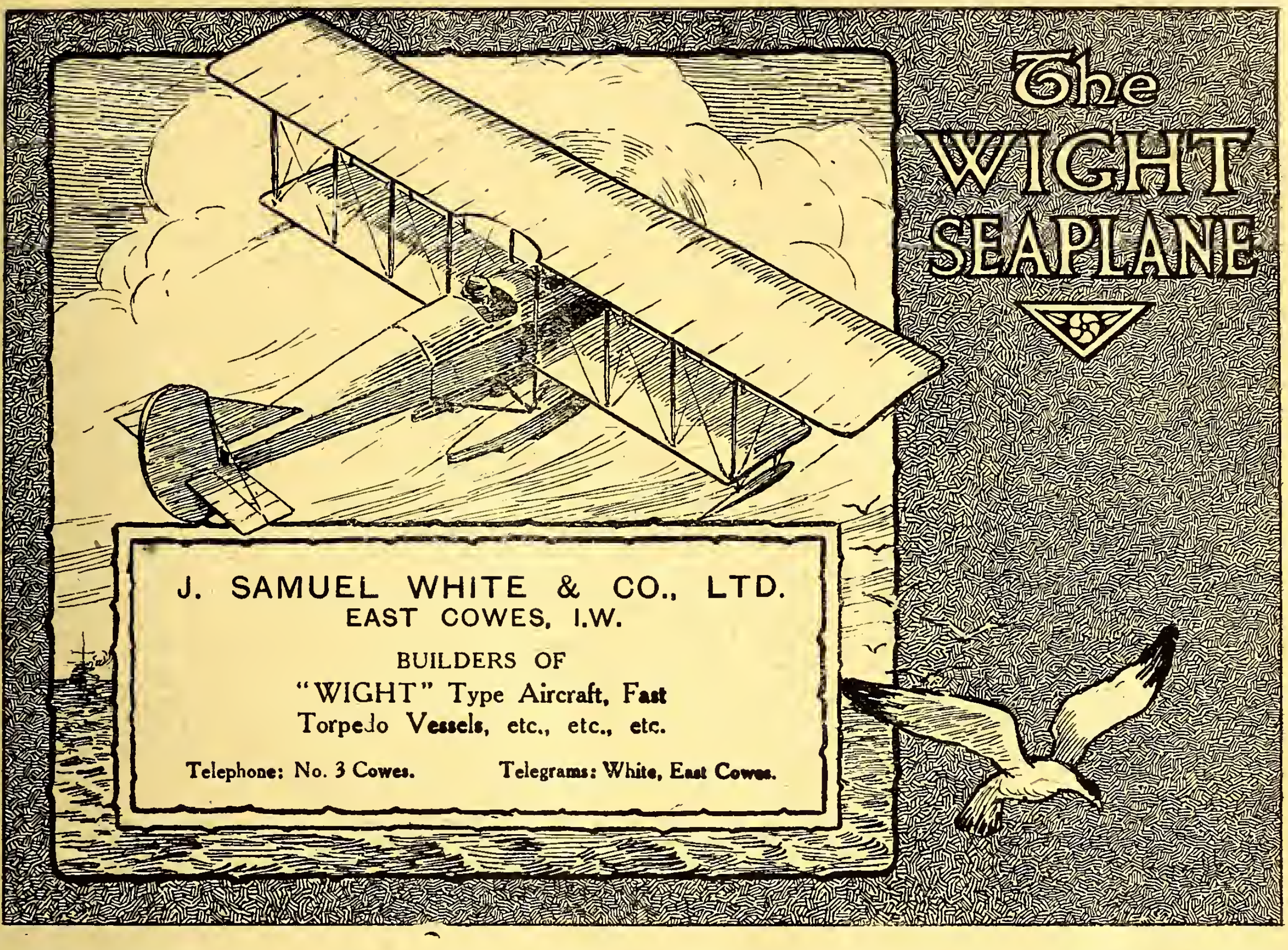
A monocoque Morane monoplane of "Le Vengeur" type, the French "opposite number" of the Fokker.



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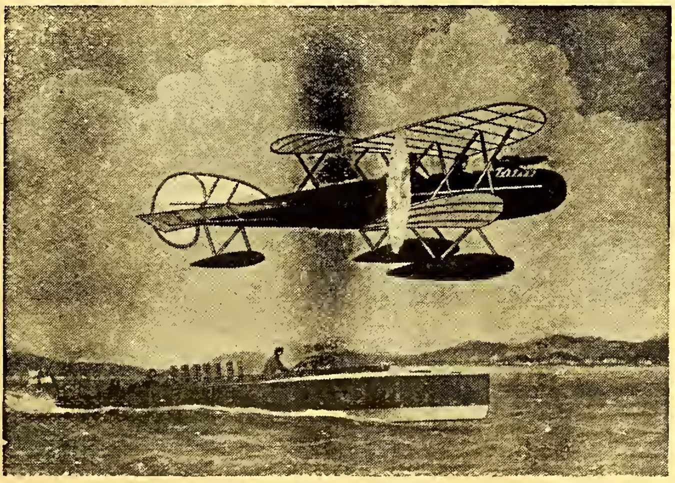

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Mr. French was caught in a snowstorm and was forced to descend, and in coming down his machine crashed into some trees. On reaching the ground the machine burst into flames, as was the case in the earlier accident. Death was instantaneous. Mr. French, who was a son of Mr. C. D. French, of Utting Hall, Malden, Essex, received a temporary commission last August.

* * *

LUKIS.—Sec. Lt. L. C. Fellowes Lukis, Essex Regt., attached R.F.C., killed, was in his 19th year, and was the second son of Mr. and Mrs. W. R. Fellowes Lukis (now in Australia), and grandson of Mr. S. T. Smith, R.A., commanding No. 8 Depot, R.F.A., Hilsea.

* * *

McWHA.—Sec. Lt. Archibald John McWha, R.F.C., third son of Mr. and Mrs. Dupré McWha, of India, late of Bedford, was killed on active service, aged 23. He was educated at Bedford School, and joined the R.F.C. at the beginning of last year.

* * *

PEMBERTON.—Capt. Alan John MacDonald Pemberton, M.C., Leinster Regt., attached R.F.C., who has died of wounds as a prisoner of war in German hands, was the son of the late Major-General W. W. Pemberton, I.S.C. Born at Toronto in 1892, he was educated at Fairfield, Malvern Link, and at Repton (The Priory), and obtained his commission in the Leinsters in 1911. He went out to the front in December, 1914, and was present at the battles of St. Eloi and Ypres. Mentioned in dispatches, he was awarded the Military Cross. He joined the R.F.C. in January of last year, and went to the front in October.

* * *

ROBERTSON.—Lt. John Keith Grant Robertson, R.F.C., who was reported killed on Jan. 1st, was the elder son of Mr. John Herbert Robertson, I.C.S. Retired, now serving with the Royal Fusiliers at the front, and Mrs. Robertson, of Ark Royal, Buckhurst Hill, Essex. Born at Fittleworth, Sussex, in 1895, he was educated at St. Cyprian's, Eastbourne, Harrow School, "La Chatelaine," Geneva, and Edinburgh University, which he left to pursue a business career in the firm of Messrs. Robert Ingham Clark and Co., Westham Abbey, Stratford. On the outbreak of war he enlisted in the R.A.M.C., obtained a commission in the A.S.C. in Nov., 1914, went to the front in August, 1915, and was invalided home in March, 1916. He afterwards joined the R.F.C., obtaining his wings on returning to the front last November. His Flight Commander says:—"I can only assure you of the grief felt by both officers and men of the squadron at the death of two of the keenest and most efficient officers we had (Lt. Robertson and his observer)."

* * *

TAYLOR.—News has come of the death whilst flying in Egypt of Sec. Lt. Douglas John Taylor, R.F.C., eldest son of Mr. and Mrs. John Taylor, of Holly Grove, Frittleworth, Sussex. The gallant officer, aged 27, was a young man of great promise. In 1914 he obtained his degree of Bachelor of Science at London University, and was employed at the Imperial Institute, where he displayed considerable ability. At the outbreak of war he decided to enter the R.F.C. In 1916 he obtained his commission, and was selected for service at Salonika, being afterwards transferred to Egypt. His brother is in the Navy.

* * *

VEITCH.—Capt. Dawyck Moberly Veitch Veitch, Indian Cavalry, attached R.F.C. (previously reported missing, now reported killed), was born in January, 1890. He passed out of Sandhurst to the Unattached List for the Indian Army in January, 1910, and was gazetted to the Indian Cavalry in March, 1911. He had promotion in April, 1912. After the war began he was attached to the R.F.C. Before he became a pilot the machine on which he was flying went wrong and the pilot was compelled to land in Holland. Mr. Veitch escaped from the Fortress of Wierickerchans, where he was interned, and, after many adventures, returned to England, where he rejoined the R.F.C., and in May, 1916, was gazetted flying officer.

MARRIAGES.

BELL—PARKE.—On Dec. 10th, at Norwich, Capt. Raymond Bertram Bell, R.F.C., only child of Bertram and Mrs. Bell, of Welby Hall, Yorkshire, was married to Constance Elaine (Birdie) Parke.

* * *

BOLTON—THRING.—On the 9th inst., at St. Stephen's, Bath, by the Ven. the Archdeacon of Bath, Capt. Norman Bolton, R.F.C., eldest son of Mr. and Mrs. Bolton, Highcroft, Sutton, was married to Ethel, younger daughter of Mr. and Mrs. Huntley Thring, 1, Springfield Place, Bath.

* * *

GRAZEBROOK—WESTMORE.—On the 12th inst., at St. Michael and All Angels', Bournemouth, by the Rev. E. Moor, Henry Broome Durley Grazebrook, M.A. (Oxon), of Gray's Inn and the Middle Temple, Barrister-at-Law (now Sec. Lieut. R.F.C.), elder son of Mr. and Mrs. H. Durley Grazebrook, of Caenwood Grange, Beulah Hill, Upper Norwood, was married to Ethel Gertrude, elder daughter of Mr. and Mrs. A. S. Westmore, of Bournemouth.

ROWELL—KING.—On Jan. 2nd, 1917, at Chipping Norton, Oxon, by the Rev. H. H. Arkell, Robert Norman, of R.F.C., eldest son of W. N. Rowell, J.P., of Ivydene, Chipping Norton, was married to Helen Margaret, daughter of Alfred King, of Chipping Norton.

ENGAGEMENTS.

MARSHALL—ORR-EWING.—An engagement is announced between Herbert William Hare, R.F.C., only son of the late Colonel Herbert Seymour Marshall, Punjab Infantry, and Mrs. Marshall, of Revelstoke, British Columbia, and Evelyn Margaret, fourth daughter of the late Mr. John Orr-Ewing and Mrs. Orr-Ewing, of Holmer, Weston-super-Mare.

* * *

PEMBERTON—JOHNSON.—A marriage has been arranged, and will take place at St. Peter's-in-the-East, Oxford, on Saturday, Jan. 20th, between Sec. Lt. S. M. Pemberton, R.F.C., elder son of the late Rev. A. H. Pemberton and Mrs. Pemberton, of Bury St. Edmunds, and Eileen M. Chapman Johnson, widow of J. Chapman Johnson, and youngest daughter of the late Dr. W Bedell Benison and Mrs. Benison, of King's Heath.

BIRTHS.

ASHTON.—On Jan. 14th, 1917, at Penton, Addlestone, the wife of Capt. W. Ashton, Worcestershire Regt. and R.F.C.—a daughter.

* * *

CUNNINGHAM.—On January 1st, at St. Mary's Manor, Beverley, East Yorks, Lylie (neé Miller), the wife of Major J. A. Cunningham, R.F.A. and R.F.C., of a son.

* * *

GREENWOOD.—On Jan. 10th, at Broadfield, Kingswinford, to Maj. B. P. Greenwood, R.F.C., and Mrs. Greenwood—a son.

* * *

HULL.—On Jan. 10th, at Sutton Park House, near Guildford, the wife of Capt. L. S. B. Hull, The Queen's, attd. R.F.C., of a son.

* * *

WHEATLEY.—On Jan. 6th, 1917, the wife of Capt. C. W. C. Wheatley, R.F.C.—a daughter.

The R.F.C. is now open to recruiting for textile fitters as armourers, acetylene welders, carpenters, coppersmiths, motor transport drivers, electricians, engineer fitters, watchmakers, and instrument repairers, mechanics with experience of wireless telegraphy, cabinet makers as riggers, tailors as sailmakers, vulcanisers, and petrol winch drivers and fitters. All these men must be classed either as B1 or B2.

Men over 33 years of age can, though unskilled, be accepted for the balloon party (B1 or B2) or for the labour section (B3). There are also openings for cooks and storemen (B2), clerks and draughtsmen with engineering experience (B3), and tailors and shoemakers (C2 or C3). Motor cyclists are accepted if in medical category A or B1, if they have good eyesight.

Applications should be made to Major Mitchell, the Polytechnic, Regent Street, London, W.

* * *

A New Zealand paper publishes the following paragraph:—

Sir Thomas Mackenzie, High Commissioner for New Zealand, has received from Lt. S. Howard Ellis, son of Mr. H. Ellis, of New Lynn, a letter written from a German military hospital. Lt. Ellis, who took part in the great aerial raid which accompanied the opening of the Somme offensive, writes: "I was brought down by an 'archie,' or anti-aircraft gun, on July 3rd, hit in the left leg (which was broken and put me out of action) and in the right cheek. The leg is more serious, and that is only a matter of a few weeks. I was a bit seedy for a day or so, but am now mending rapidly. I have been treated with most wonderful kindness by all ranks throughout, from the man who lifted me out of my machine (which was crashed) to the very able surgeon who now attends me."

AIR BOARD REPORTS

The following is an extract from reports of the work of the R.F.C. in the Eastern Mediterranean theatre of war issued for publication on Jan. 12th:—

Two of our machines which were sent on reconnaissance found, on arrival at their destination, that two hostile machines were patrolling above the place. Photography was, nevertheless, proceeded with. An engagement followed, in which the hostile machines were driven off. In the course of it Capt. "M.'s" machine was hit, and he was forced to descend. He immediately burnt his machine. The other machine (Capt. "F.") descended to the rescue. Capt. "M." climbed on the engine cowl, and the two pilots escaped. When the machine left the ground a large number of the enemy were running to it, the nearest of them being within 200 yards.

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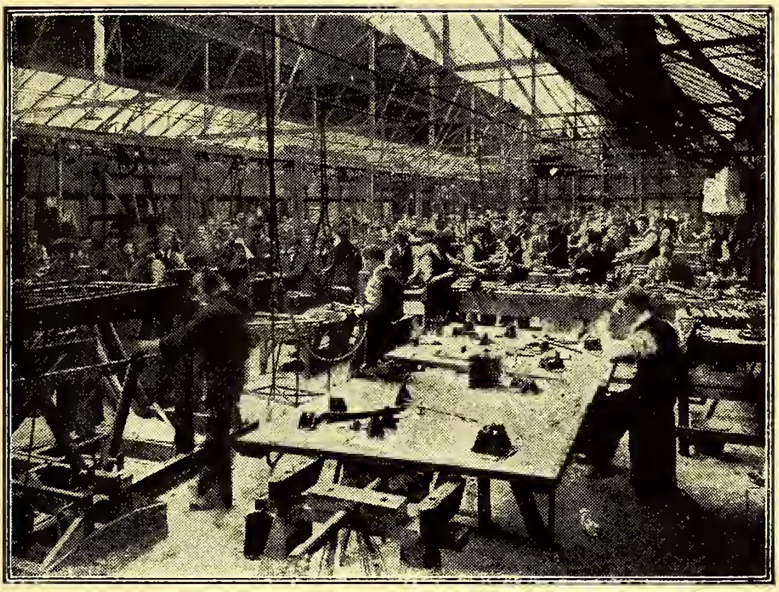

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FRANCE.

Official Communiqués.

Jan. 11th.—Army of Orient.—British seaplanes have bombarded Gerevitch, south-east of Xanthi. Twelve British aeroplanes effectively bombarded the military establishments at Hudovo and Strumnitza.

A squadron of eight French aeroplanes succeeded in bombarding an important camp near Veles.

Jan. 14th.—An enemy aeroplane was forced to land in our lines near Pont-à-Mousson. The aviators were taken prisoners.

* * *

It was reported from Paris that one or more Zeppelins were signalled on the night of Jan. 11th as coming from the east.

The new method of alarm was perfectly successful, and there was the usual rush for a good view to the heights of Montmartre.

No enemy aircraft appeared, and the signal that the alarm was at an end was given at 7.40 p.m.

* * *

It is reported that M. Henri Brégi has been killed while testing a seaplane at Toulon.

Henri Brégi was one of the pioneer aeroplane pilots of France, and performed most consistent work on Bréguet aeroplanes and seaplanes. Attached to the French Flying Service, he carried out very early experiments with the regulation of artillery fire from aeroplanes. In 1911 he flew from Casa Blanca to Fez, practically the first flight over a war area.

The deaths of the French military pilots, Bedora and Sauvage, are also reported.

GERMANY.

Official Communiqué.

Jan. 11th.—Our aviators shot down two British captive balloons, which fell burning.

* * *

It is reported from The Hague on Jan. 9th, on the authority of a neutral eye-witness, that within the last five weeks three fires have broken out in Zeppelin sheds at Kiel, all of incendiary origin, and presumably the work of dissatisfied workmen, who hope thereby to do something towards bringing about peace.

The informant, who witnessed the last of these fires, says that the "bag" was two new Zeppelins and twenty-four aeroplanes, as the neighbouring warplane sheds were also set on fire.

Five carbonised bodies were found in one shed, three civilians and two soldiers. Two of the civilians are described in Kiel military circles as "British spies." For three days after the last fire nobody was allowed in or out of Kiel, the authorities fearing the leakage of the news.

[Again one must repeat the old warning that Holland is a low lying country.—Ed.]

* * *

It is stated in the "Lokalanzeiger" that Prince Friedrich Sigismund. the eldest, and Prince Friedrich Karl, the second, son of Prince Friedrich Leopold of Prussia, have entered the German flying corps.

RUSSIA.

Official Communiqués.

Jan. 9th.—In the evening of Jan. 8th enemy aeroplanes dropped bombs on Lutsk.

Jan. 10th.—In the region of the village Minitchi (on the Shara, south of Slutsk high road) one of our aviators hit an enemy aeroplane, which fell into the enemy's lines.

During the night of Jan. 9th several squadrons of enemy aeroplanes dropped bombs on Lutsk.

Jan. 12th.—Roumanian Front.—During our reconnoitring operations in the vicinity of the Putna Valley one of our aeroplanes met two enemy machines and engaged in battle with one of them, compelling it to descend.

Jan. 15th.—A hostile aeroplane squadron, composed of 13 machines, dropped bombs on the station and town of Radziviloff.

Our aeroplanes, which were reconnoitring behind the enemy's lines, came down to 1,400 metres, and turned their machine-guns on an enemy battery near the village of Krokow, 20 versts east of Zloczow

AUSTRIA.

Official Communiqué.

Jan. 12th.—On the night of Jan. 11th-12th a squadron of our seaplanes successfully bombed the enemy's anti-aircraft station at Beligna (Aquileia), which had been rebuilt since its destruction by our aviators on Nov. 11th and Dec. 6th, 1916. A new shed was several times hit.

ITALY

Official Communiqués.

Jan. 9th.—Enemy aeroplanes yesterday attempted several raids on our territory, but were repulsed by our anti-aircraft batteries and pursued by our chasers.

One of our squadrons successfully bombarded military objectives in Reifenberg, St. Daniele, and Kobdil in the valley of the Branica (a confluent of the Vippacco). Escaping from the enemy's anti-aircraft fire and driving back all attacks of hostile aeroplanes our machines returned safely to their bases.

Jan. 12th.—During the night of Jan. 11th-12th an enemy air squadron dropped a considerable number of bombs in the neighbourhood of Aquileia (mouth of the Isonzo); three men were wounded, and some damage was done.

One of the enemy seaplanes was brought down by our anti-aircraft batteries. The aviators were taken prisoners. At the same time, two of our aeroplanes successfully bombarded the aviation ground at Prosecco, on the railway, five miles north of Trieste) and the seaplane base in the harbour of Trieste. Escaping from the heavy fire of enemy anti-aircraft batteries, they returned safely.

Jan. 12th.—On the night of Jan. 11th our seaplanes carried out a raid over the enemy's territory, dropping bombs with destructive effect on the cross-roads of Prosecco and the military works at Trieste. Our machines returned without damage to their base in spite of intense fire by the enemy artillery.

During the night two enemy seaplanes unsuccessfully endeavoured to raid Grado and Cervignano. One of them, the 'K 301,' was hit by our anti-aircraft batteries, and was forced to land. The aviators were taken prisoners.

Jan. 13th.—Italian and French seaplanes yesterday effected an offensive reconnaissance over Pola, dropping bombs on enemy units. Counter-attacks were made by enemy aeroplanes, which were repulsed in an aerial fight. One of our seaplanes fought three enemy aeroplanes one after another, and drove them off.

Bombs were dropped by enemy aeroplanes on our torpedo-boats at sea without effect. All our aerial and naval units returned undamaged to their base.

BULGARIA.

Official Communiqués.

Jan. 11th.—In the Drama region an enemy aeroplane was forced to come to earth. We took prisoners the occupants, who were both Serbians. The machine was completely intact.

[This is the first official intimation of an aviation unit composed entirely of Serbs. One gathers unofficially that the Serbian aviators, of whom there are a small number, are doing quite good work.—Ed.]

Jan. 14th.—Our aeroplanes dropped bombs on the port of St. Georges (at the southern mouth of the Danube) and near an aeroplane station.

TURKEY.

Official Communiqué.

Jan. 14th.—It has been verified that the British cruiser, the destruction of which was announced yesterday, was a seaplane-carrier, and the patrol boat which was seriously damaged was an enemy gunboat.

* * *

The Press Bureau states that in the German Wireless Press message received on Saturday, Jan. 13th, there appeared the following:—

"Turkish Headquarters Report, Jan. 11th.—Caucasian Front.—We opened surprising fire against hostile ships in Port Meys. We destroyed by direct hit British cruiser of 'Juno' type. Cruiser had no time to open fire. Wreck of cruiser still burning."

On this the Secretary of the Admiralty makes the following comment:—

"No British cruiser was sunk as alleged. Presumably the vessel referred to was H.M. Seaplane Carrier 'Ben My Chree,' the loss of which in Kastelorizo Harbour was published on the 11th inst."

In connection with this report it is of interest to note that on Sunday, Jan. 14th, London was flooded with placards saying, "Loss of Two Enemy Warships." Upon the expenditure of a copper the "warships" turned out to be submarines! This sort of thing should be stopped by both sides.

GREECE.

According to the "Matin," M. Guillemin, French Minister at Athens, on Jan. 8th, flew over the harbour of Salamis and the Piræus in a seaplane, piloted by a sous-lieutenant.

BELGIUM.

According to a report from Amsterdam on Jan. 9th, a Berlin official telegram states that German naval aeroplanes on Jan. 7th successfully bombed barracks west of La Panne and Nieuport Bains (on the Belgian coast between Ostend and Dunkirk).

EAST AFRICA.

Some particulars of the successful work done by the South African Squadron of the Royal Flying Corps are supplied by Reuter's correspondent with the East African Forces.

Dangers of flying in that country should not be under-estimated. A forced landing almost invariably means a crash, and the pilot is more than lucky if he escapes with his life.

The endless forests lent themselves admirably to the concealment of troops on foot; herds of game, causing clouds of dust, were frequently mistaken for moving columns. On one occasion a swarm of locusts was mistaken for a dust cloud. In the morning ground mists and the miasma from the marshes, and in the afternoon low-lying clouds, baffled the observer.

The corps has been of the greatest use from a military point of

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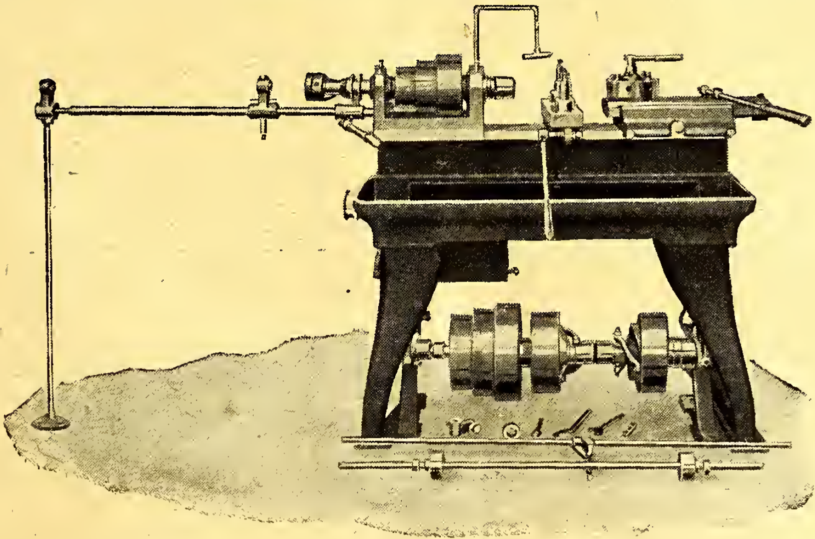

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view. Indeed, without it the campaign must have been very greatly prolonged.

One of the most successful of the bombing raids by the squadron took place on Aug. 11th, when five aeroplanes attacked the town and fortified camp of Ngulu Kwa Boga. Some 200 or 300 of the enemy were killed or injured, and the damage done by fire to food supplies and clothing was enormous.

Altogether the day should be written down most successful, and it added to the dread which the enemy already had of our "Sdege"—the birds that drop the eggs of death.

U. S. A.

Mr. Daniels, Secretary of the Navy, announced on Jan. 9th that an airship of the Zeppelin type, armed with "large calibre rifles and howitzers," had been ordered for the United States navy and army.

[The "howitzers" would probably come in useful as ballast when hard-pressed for buoyancy. The crew certainly would never vent their homicidal instincts by firing them !—Ed.]

A FACTORY CHARGE.

On Jan. 4th Peter Maw Brown, a foreman at the Royal Aircraft Factory, was charged at Aldershot with unlawfully communicating certain information regarding aeroplanes, and an Italian named Fregoso, and Herbert Allan Mothershill, a motor engineer, both of Brighton, were jointly charged with receiving such information.

Counsel for the prosecution handed to the Bench a large number of documents, the contents of which were not publicly disclosed. It was contended by the defence that the documents contained nothing that any engineer would not know. After certain evidence had been taken the case was adjourned for a week.

At the final hearing at Aldershot on Jan. 15th, all three defendants were convicted. The Chairman of the Bench said that the characters of the men were beyond reproach, but that technical offences had been committed.

THE NEW MANNER.

WELL-KNOWN Flying Corps Officer, requiring ROLLS-ROYCE CAR immediately, would be glad to hear from owner wishing to SELL; late type preferred, body unimportant.—Car, 5, Queen's Gate Terrace, S.W.

The advertisement which appears above is taken from the "Morning Post," and raises curious thoughts about the manner of the new type officer. Why should a would-be purchaser of an *automobile de luxe* advertise that he is in the R.F.C.? And why should the fact that he is, as self-styled, "well-known," make any difference to the replies which he may receive?

Does the advertiser expect to receive special terms because he is in the R.F.C., or a famous (or notorious) personality? If not, why should he inflict those facts on the readers of the "Morning Post"? If he does, is he under the impression that it is "as done" by the best military people to trade on the reputation of one's regiment, or on one's own Service reputation?

One can imagine—perhaps—an officer of His Majesty's Brigade of Guards advertising :—

"Officer returned from Front owing to nerve strain wishes to hire restful residence at Maidenhead, having won the M.C., D.S.O., and V.C. in succession, and being a Guardee, he expects preferential treatment."

Or an officer of the Submarine Service advertising :—

"Popular and much photographed Naval Officer, well known as the 'Parkstone Pirate,' winner of the D.S.C., the Albert Medal, etc., sinker of three dhows in the Marmora, and of two dredgers in the Baltic, desiring to leave the sea and buy a farm, invites tenders made duly tender by his services to the Empire—not to mention the Palace and Alhambra."

The cases are not dissimilar.

THE R.N.A.S. COMFORTS FUND.

The following cash contributions have been received since Dec. 31st, 1916 :—Mrs. Mackworth, £51 5s. ; Mrs. Samson, £4 4s. ; the Hoyt Metal Co., £2. Total to date, £2,605 11s. 2d. Further contributions in cash or kind should be sent to Mrs. Sueter, The Howe, Watlington, Oxon.

THE JOURNALISTIC TOUCH.

Though it is rather a shame to drag the gallant officer into the limelight, it would be still a greater shame to deprive readers of the following priceless effort, which is reproduced exactly, apropos the sinking of the "Ben-my-Chree," from the "Star" of Jan. 11th :—

"Commander Samson is perhaps the most famous of the British naval airmen. He was first lietuenant on the scout Foresight in 1910, when he was chosen by the Admiralty as one of four officers to undergo a course of instruction in fling at Eastchurch.

"It was he who flew over the German Imperial yacht when the Kaiser arrived in the Medway in 1911.

"He was the first officer to make a successful flight from a

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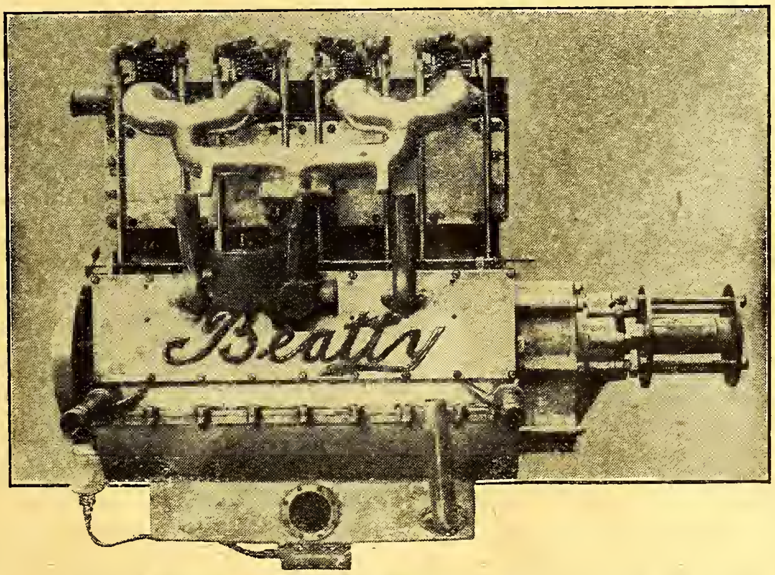

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British warship. At Weymouth, when the King visited his fleet in 1912, Commander Samson's daring flights in his hydroplane created a great sensation."—[Some hydroplane !—Ed.]

"He is a veritable genius.

"Early in the war he did brilliant work in command of a small armoured motor-car force, which harried the Uhlan patrols forerunning the German invasion of France. His force was called the Aeroplane and Armoured Motor Support of the R.N.A.S. (Naval Wing), with headquarters at Dunkirk, and it was one of his men who carried out the feat of changing an aeroplane propeller blade while the machine was flying 2,000 feet above the sea."

[This is evidently a dim recollection of the sportsman who did actually change a propeller on the Parseval airship while over the North Sea.—Ed.]

"He it was who led a night flying raid on Brussels in December, 1914—just about two years from the date when he established a world's record in naval flying by piloting a Short hydroplane from Sheerness to Portsmouth—a wonderful feat in those days.

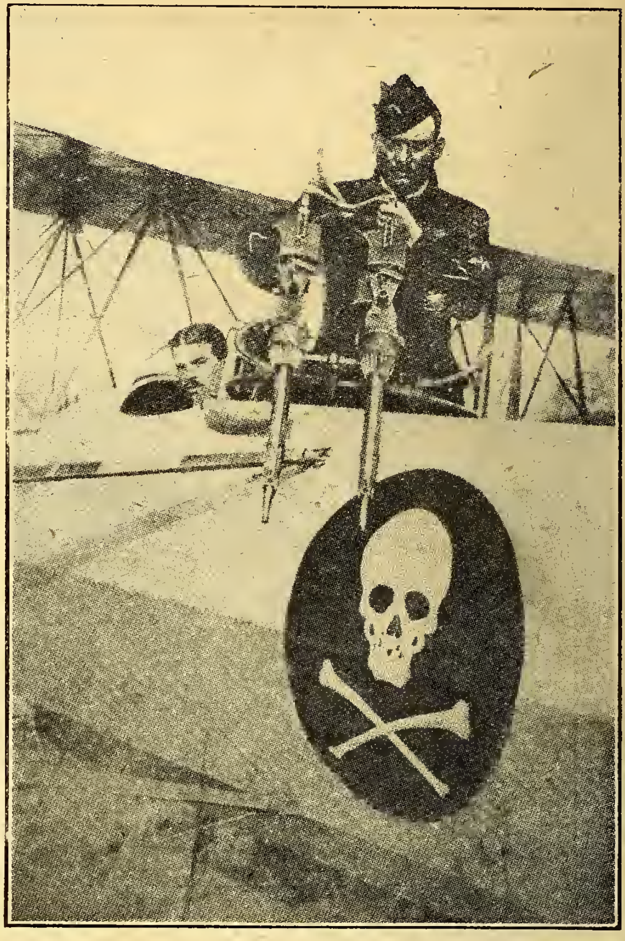
"Then, in February he was in command of the 34 aeroplanes and seaplanes which flew from Dover and raided the Belgian coast with great effect. It was in that raid that Grahame-White fell into the sea.

"Commander Samson, who has a striking physical resemblance to Captain Kettle, Mr. Cutcliffe Hyne's hero, has three brothers also serving."

FREE TO TRAVEL AGAIN.

Some little time ago the Postal Censor decreed that "All the World's Aircraft," the annual book of reference on aircraft matters published by Sampson Low, Marston and Co., Ltd., was not to be sent to neutral countries or, indeed, to any foreign countries —even to Allies. This regulation was issued after the volume had been on sale for some months, and after a number of copies had already been sent abroad.

The embargo has now been removed, and copies may be obtained by readers abroad. It must be understood, however, that owing to the regulation that no printed matter is allowed to go to neutral countries except direct from publishers, who are given special permits for the purpose by the authorities, anyone in this country who wishes to send copies of "All the World's Aircraft" abroad can only do so through Sampson Low, Marston and Co., Ltd., 100, Southwark Street, London, S.E., or through some publishing firm, such as the William Dawson Publishing Co., Ltd., of 2, Breams Buildings, E.C., who are licensed to send periodicals abroad.



(Reproduced from "Aviation," New York.)

A twin machine-gun arrangement used by a French aviator.

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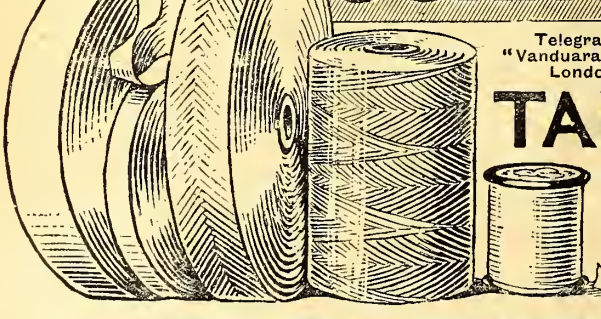

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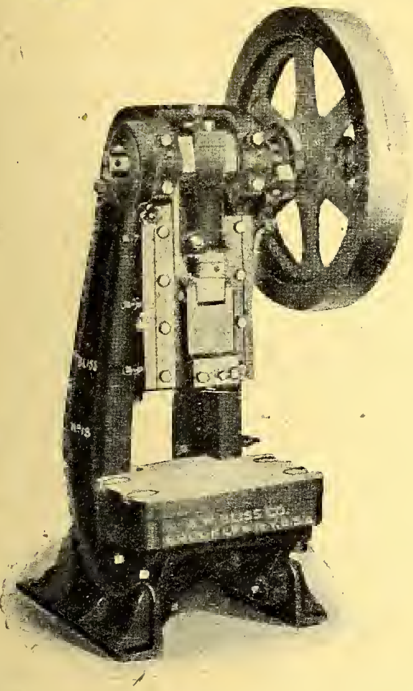

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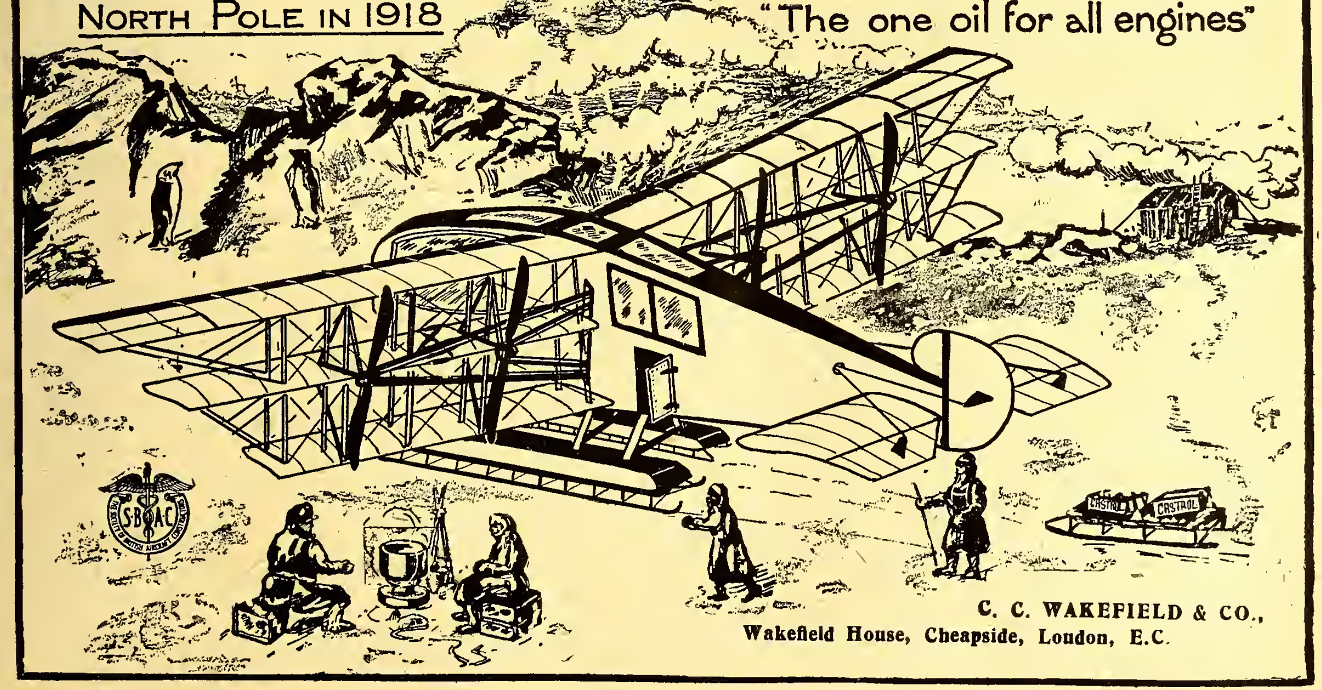

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THE AERONAUTICAL HISTORY EXHIBITION.

The following statement with reference to Lady Drogheda's show of aeronautical history, which was postponed from November last, has been issued by A. J. Wilson and Co., Ltd., the well-known advertising agents :—

> Sir Arthur du Cros, Bart., Chairman of the Dunlop Rubber Company, Limited, would greatly appreciate the favour of insertion of the following interesting news item in your valuable columns.

FIVE CENTURIES OF AIRCRAFT.

At the GROSVENOR GALLERIES in New Bond Street an Exhibition of exceptional interest is being organised by the COUNTESS OF DROGHEDA. It is the FIRST HISTORICAL EXHIBITION showing the COMPLETE STORY OF AERONAUTICS from the beginning to the present day.

By pictures, photographs, models, component parts and complete aeroplanes the visitor can trace the science of aviation from the earliest to the latest times.

Doubtless the modern side will attract chief attention. Exhibits include an array of ZEPPELIN RELICS loaned by the ROYAL FLYING CORPS and the ROYAL NAVAL AIR SERVICE, such as a MACHINE RIFLE from the CUFFLEY AIRSHIP, and other MACHINE GUNS, several PETROL TANKS, a COMPLETE GONDOLA and the INTACT STERN OF A ZEPPELIN

A COMPLETE FOKKER of the latest type, brought down by one of our own airmen, lends an air of actuality to the exhibition.

Pictorially, the exhibition will be particularly attractive. Hundreds of old prints show the earliest attempts at flight, and the gradual evolution of the idea that led to the ultimate conquest of the air is traced. There are OFFICIAL PHOTOGRAPHS loaned by the WAR OFFICE and the ADMIRALTY recording last year's brilliant performances in the air, none of which have been allowed to appear in print; and these are supplemented by a number of "Daily Mail" photographs of the battlefields on all fronts, taken from the air, also unpublished.

THE FRENCH AERO CLUB and the AERONAUTICAL SOCIETY contribute objects of the highest value and interest; and Raemaeker, Gordon Crosbie, John Lavery, Norman Wilkinson, Joseph Pennell, Herbert Finn and others will be represented by typical examples of their art, all dealing with some episode connected with flight; and the Editors of "Flight," the "Aeroplane," and the "Sphere" have loaned original drawings.

THE COUNTESS OF DROGHEDA HAS BEEN SUPPORTED AND ASSISTED THROUGHOUT BY BRIGADIER-GENERAL BRANCKER, DIRECTOR OF AIR ORGANISATION, AND BY COMMODORE MURRAY SUETER, OF THE AIR DEPARTMENT OF THE ADMIRALTY.

The proceeds of the exhibition are to be devoted entirely to the benefit of the FLYING SERVICES AND THE IRISH HOSPITALS SUPPLY DEPOTS working for and under the British Red Cross Society.

The opening date will be shortly announced

INVASIONS OF ENGLAND.

The decomposed and charred bodies of two men, washed ashore on the North-East Coast on Jan. 9th, were heavily clothed, and are apparently those of members of the crew of the Zeppelin which was brought down in flames off the Durham coast some weeks ago.

These are the first remains of the Zeppelin crew to be found. Their release from the wreckage of the dirigible is doubtless due to the gale.

The bodies were buried on Jan. 11th in the same grave in a village graveyard. The Army chaplain read the full Church of England burial service, a firing party fired three volleys over the grave, and buglers sounded the "Last Post."

* * *

The body of a German aviator was washed up on the North-East Coast on Jan. 15th. It is apparently that of another of the crew of the wrecked Zeppelin which came down in flames off the Durham coast about six weeks ago.

* * *

The War Office has presented to Colchester Museum a machine gun which was thrown from a Zeppelin in the district, and also part of the wrecked L33.

THE CREEPING BARRAGE AND AIRCRAFT.

One who has "been there" points out that the reference in this paper last week to the invention of the creeping barrage which has proved so successful in co-operation with aircraft was erroneous. Apparently the actual inventor of this system was General Sir Henry Horne, whose high professional ability has brought him to important commands in the Army, and whose skill as an artilleryman has been of the very highest value to the Army in France.

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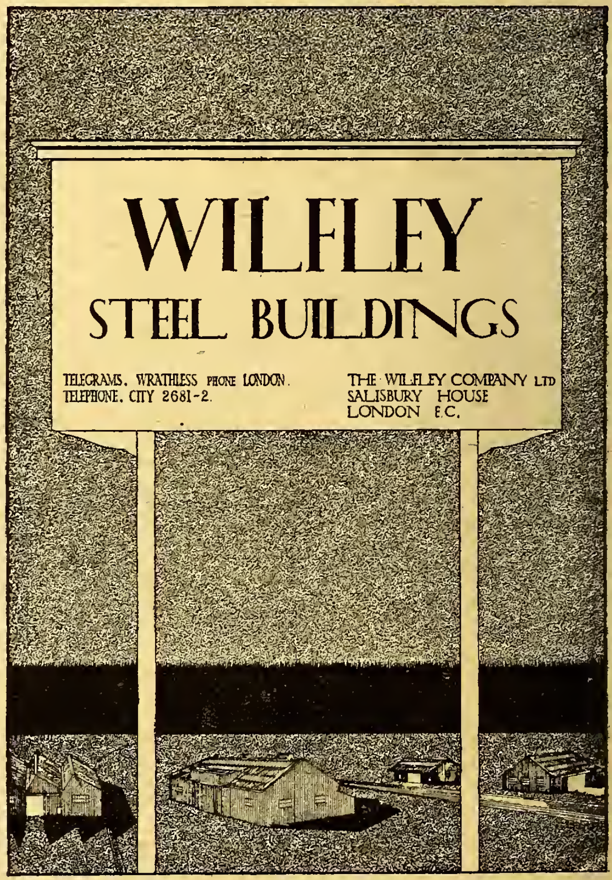

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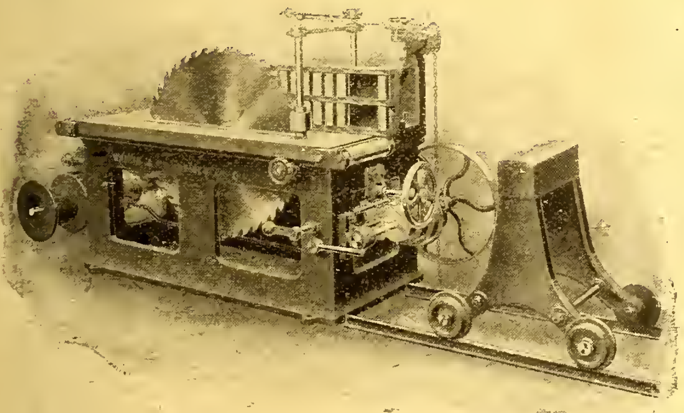

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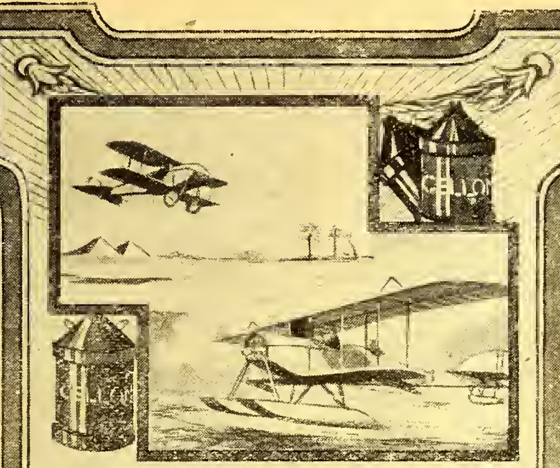

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ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of The Aeroplane. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

R. A. S. (Birmingham).—No book has yet been published describing and naming the different parts of an aeroplane with a separate illustration of each part, but "The Aeroplane Speaks," by Capt. H. Barber, should help you considerably, as it contains a comprehensive glossary of aeronautical terms, which includes the names of different parts of an aeroplane, and the book also gives particulars of the principles involved in rigging, etc., which naturally includes a good many definitions of the different parts of the machine, etc. This book can be obtained from the Wm. Dawson Publishing Co., Ltd., Rolls House, Breams Buildings, E.C., price 6s., post free.

R. F. H. (Castle Hedingham).—Lads who are anxious to be taught a trade in either the R.N.A.S. or the R.F.C. can obtain appointment as Boy Ratings or Boy Learners as the case may be. Applications should be made respectively to the R.N.A.S. Recruiting Depot, Crystal Palace, and to the R.F.C. Recruiting Depot, South Farnborough, Hants, or the R.F.C. Recruiting Depot, The Polytechnic, Regent Street, London, S.W.

F. S. (Trowbridge).—Applications for enlistment in the R.N.A.S should be addressed to the Royal Naval Air Station, Crystal Palace, Sydenham, and applications for enlistment in the R.F.C. to the R.F.C. Recruiting Depot, South Farnborough, Hants, or to the R.F.C. Recruiting Depot, The Polytechnic, Regent Street, W. Presumably Class B.1 men are eligible as car and motor-cycle drivers.

N. F. (West Cowes).—You should apply for appointment to an R.F.C. Cadet Battalion. The Department of Military Aeronautics at Adastral House, E.C., deals with such matters. Your O.T.C. training should assist you materially.

B. M.-S. (Aberdeen).—The kit required by a Cadet in the Royal Flying Corps is merely an officer's tunic with no stars or facings, a "Glengarry" cap, and the usual slacks, riding-breeches and top boots. As a matter of fact some firms make a speciality of supplying Cadet's kit for the £10 allowed by the War Office.

The period of training depends very largely upon the ability of the Cadet, but there is no doubt that it is very thorough. An applicant would certainly have to be prepared to show his birth certificate on demand.

L. C. (Upavon).—The optical firm which makes a speciality of working Triplex Safety Glass optically for spectacles and goggles is Melson and Wingate, Ltd., of 30, Wigmore Street, W.

S. E. (Barnsley).—It is practically impossible for an enlisted man to transfer from one branch of the Army to another, unless his services are specially requisitioned by the C.O. of the unit to which he wishes to transfer. It seems likely, therefore, that you will have to be content with remaining in the R.Es., although your disappointment is quite natural.

A. D. S. (Sleaford).—One of the most up-to-date books on aero-engines was written by Kean in 1915, called "Aeronautical Engines." The price is 6s. net. Copies can be obtained from the William Dawson Publishing Co., Ltd., Rolls House, Breams Buildings, Chancery Lane, E.C.

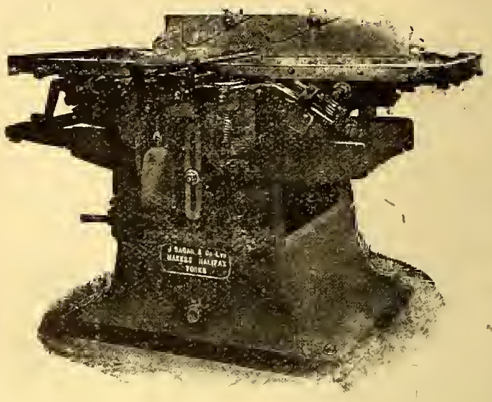
L. H. (Crawley).—The best method for a boy of 17 who wishes to join the wireless, or any other, section of the R.N.A.S., is to write to the Air Department, The Admiralty, S.W., and ask for further particulars.

L. M. (Tunbridge Wells).—(1) The regulation by which a pilot in the R.F.C. is taken on for four years only is a sensible arrangement which permits the authorities to dispense in a kindly way with the services of an officer whose nerve may have gone so that he has ceased to be of value as a pilot, and whose brain power is not such as to make it worth while to retain him for organising work on the ground. If a man's nerve holds out, or if he proves fit for command, or if he shows actual ability in other directions, there is not the least fear of the authorities throwing away the knowledge he has learnt in the four years. Therefore, any one who is confident about his nerve, skill, or mental ability, need have no fear about adopting the Flying Corps for his life work.

(2) A recommendation from the headmaster of a big public school would not necessarily be a special nomination, but it would, undoubtedly, carry very great weight with the R.F.C. authorities. On the other hand, it is understood that the headmasters of certain schools are entitled to give special nominations. In any case, the candidate for an R.F.C. commission would have to go through a cadet corps, as the R.F.C. Cadet Corps are apparently the equivalent of Sandhurst.

A. H. H. (Hounslow).—The qualifications for an R.F.C. cadet are, apparently, a decent education, a decent appearance, and a decent manner. That is to say, his exterior qualifications should suggest that a candidate might make a decent officer. The probationary period as a cadet is designed to discover whether the cadet also possesses the mental and moral qualifications desirable in an officer. While in a cadet corps the would-be officer is to all intents and purposes a private soldier, and is housed and fed at the Army's expense. All details can be obtained from the Directorate of Military Aeronautics, Adastral House, E.C.

SAGAR



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G. P. (Norfolk).—N.C.Os. and men can only obtain commissions with the consent of and by application through their Commanding Officers. Applications from units other than the R.F.C. will ultimately reach the Department of Military Aeronautics at Adastral House, but only via the applicant's own C.O., and the War Office.

Any N.C.O. or man applying direct to Adastral House on his own responsibility would ultimately find his application returned to him via his own C.O., plus suitable penalties for breach of discipline.

A. M. E. (Aldershot).—Your best way of obtaining an appointment to a Cadet Corps, R.F.C., will be to ask your immediate Commanding Officer for the necessary particulars. Men in the Army can only obtain commissions by recommendations from their own C.O., and all applications must be made through him. Men recommended for commissions in any branch of the Service have to pass through a Cadet Corps, unless their previous Service work has been so thorough as to justify their being given a commission direct, such as in the cases one frequently sees in the "Gazette" of Warrant Officers and N.C.Os. promoted "for service in the field." Your wireless experience should be very much in your favour.

L. C. D. (Ealing).—So far as one can gather there is no actual Trade Union for aircraft workers at present. All the aircraft workers seem to belong to their own particular Unions, whatever they may be—either woodworkers or metal-workers of different sorts. In the London district, at any rate, a very large number of workers seem to belong to the Cabinet Makers Union, and those who are metal workers chiefly belong to the Amalgamated Society of Engineers.

A very large proportion of the workers in aircraft factories are not really skilled men at all, in the sense of having served their time to a Trade, but having done a year or so's work in an aircraft factory they are able to pose as skilled men for the purposes of the Military Service Act.

H. C. (Hounslow).—It would be an offence against the Defence of the Realm Act to tell you whether the machine you saw at Hounslow was a Curtiss or not. It is quite impossible for this paper to give readers information regarding the identification of Service aeroplanes, and it will be well if those of inquiring mind will note the fact and save valuable paper and stamps.

D. N. D. (Newbury).—(1) It is quite possible to obtain a General List commission in the R.F.C. after passing through the Cadet Corps, if the candidate shows sufficient merit. (2) A flying officer receives £1 per day from the time he is posted onwards, and naturally the rate increases in the event of promotion. (3) The signification of one wing only on an officer's tunic, attached by the root to a round O, is "Observer," and is given to all officers who habitually fly in aeroplanes without being pilots.

P. H. S. (Brighton).—You have the option of submitting your patent for a non-sooting plug to any of the well-known plug manufacturing firms, or to the Board of Invention and Research or the Ministry of Munitions. In the former instance you could probably arrange for a royalty on the plug as it was manufactured, but in the latter cases you would probably be invited to accept a definite sum if the invention was accepted.

W. (Bexhill-on-Sea).—An enormous number of girls are employed on aircraft work all over the country. Your best course to obtain employment in this direction would be to apply to the nearest Labour Exchange.

R. A. K. S. (Folkestone).—Your idea of attaching fireworks to Zeppelins with the aid of grapnels is ingenious, but antiquated. It was invented by the late Mr. S. F. Cody as far back as 1911, and even then he was possibly not the first. As a matter of fact there are far more effective ways of destroying Zeppelins than this. At the present time, once an aeroplane has got over a Zeppelin the airship is doomed, provided that the pilot can see it. There is, of course, still room for inventiveness in rapidly locating enemy airships, and in reaching them in the shortest possible time.

R. C. O. (Worthing).—In view of the fact that you have five brothers serving, and a widowed mother to support, it seems obvious that you can more readily achieve this laudable object by remaining in civil life, as, of course, you will have to start at the bottom of the ladder in the R.N.A.S. Application for enlistment should be made to the R.N.A.S. Recruiting Depot, Crystal Palace.

As regards working for the aircraft industry, your trade as an electrician would be most suited to wireless or dynamo work. An advertisement in the Miscellaneous columns of The Aeroplane seems to be the easiest method in your case of discovering whether there are suitable vacancies available for work of sufficient national importance to badge you, but application should be made through your local Labour Exchange for employment in Aircraft work. The Norman Thompson Flight Co. Ltd, of Bognor, is the nearest aircraft works to your address.

J. B. (Doncaster).—Applications for appointment as Admiralty inspectors should be addressed to the Director of the Air Department, The Admiralty, S.W.

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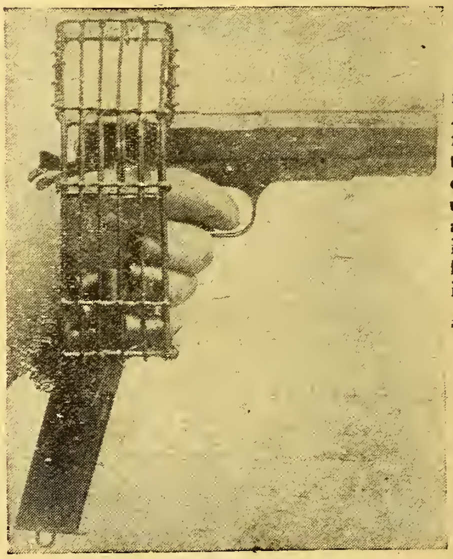

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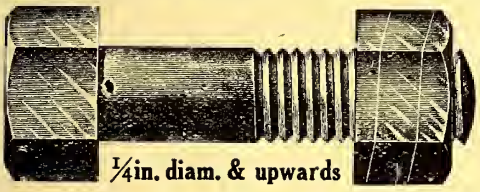

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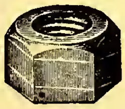

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A TRADE MOVE.

Mr. W. R. Jones, who has been closely associated with the development of the Wells Aviation Co. since the early stages of that concern, has transferred his activities to the Rivers Engineering Co., of Lots Road, Chelsea, S.W. As managing director of the latter firm, he will find still more scope for his energy and organising abilities, and those readers who have already come in contact with Mr. Jones will have very little doubt as to the future success of the Rivers Co., who are laying themselves out for the manufacture of aeroplane parts of every description.

THE WAR LOAN AT BRUNTON'S.

In order that all their employés may participate in the War Loan, Messrs. Brunton and Son, wire makers, Musselburgh, posted a notice in the works yesterday announcing that they were ready to advance money without interest to their employés and to buy War Loan stock for them, two shillings per week to be deducted from wages for every £5 invested until repayment is completed. The offer is open till the end of May.

A COMBINATION OF FORCES.

Mr. Fredk. R. Archer, Engineers' Tool Manufacturer, of 5, Farringdon Road, E.C., announces that he has amalgamated his business with the old-established business of Lehmann Bros., Hampshire Works, Station Road, Walthamstow, N.E., manufacturers of taps and dies and screw-cutting tools generally. The object of this combination is to effect economy in labour, and to facilitate the rapid execution of orders and the quick delivery of goods. The amalgamated business will be carried on at Farringdon Road and at Walthamstow under the style of Lehmann, Archer and Co.

A MAGNETO SUCCESS.

The subscription list of Fellows Magneto Co. has now been closed, Preferred shares to the value of over £46,000 out of the 50,000 8 per Cent Cumulative Preferred and Participating shares offered having been subscribed for, and allotted by the Directors.

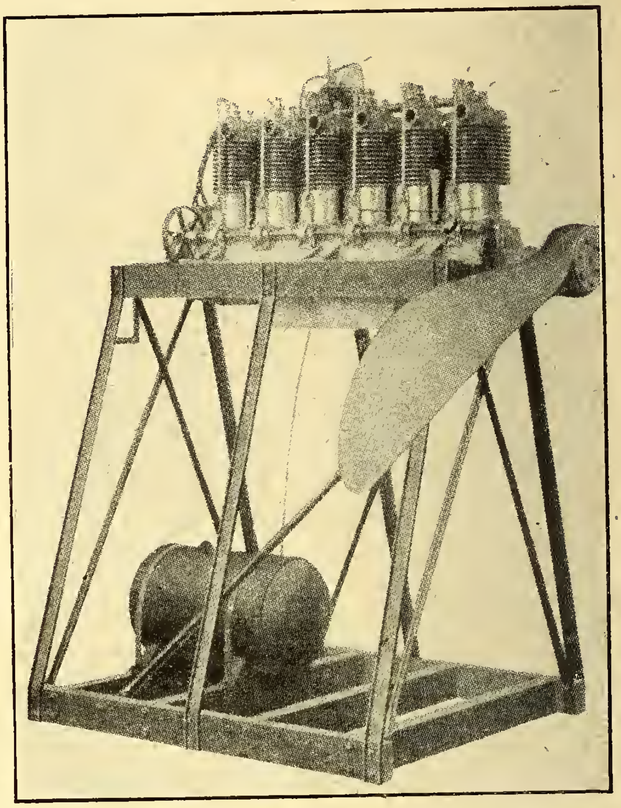
TRIPLEX AGAIN.

The following letter, dated January 6th, 1917, has been received by Mr. Delpech of the Triplex Co. :—

"Dear Sirs,—Please find enclosed one pair of Triplex goggles, which were broken yesterday when I had the misfortune of crashing a fast experimental machine.

"Will you please repair same, and let me have them as soon as possible.

"You will be pleased to hear that Triplex saved my eyes from being badly cut, and will be also interested to learn that the Triplex wind-screen was unbroken, though the immediate surroundings were battered."



The Kemp Motor, type H.6 on test stand, reference to which will be found on page 250.

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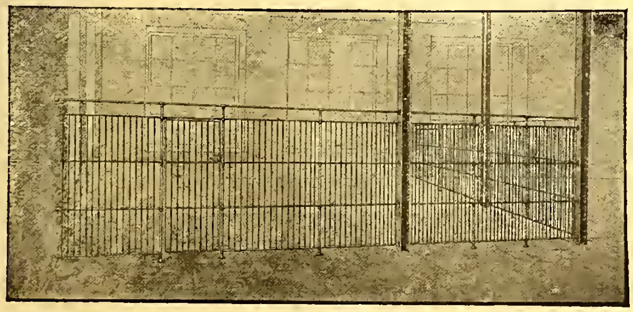

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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

As to Weight-Reduction.

One of the fundamental natural advantages of an air-cooled motor is that, power for power, it is possible to build it to a wholly stouter construction for a given mass weight per h.p. Consider now the margin for special improvement this offers: for the re-adaptation of the whole design scheme to the special aero-motor function; for the re-dispersion of the weights of detail parts, and so forth. Of course, though an additional margin of the utmost value, it has its limits well within—I should say—15 per cent. of the weight of the water-cooled example, at the maximum.

Therefore any greater reduction of weight than this must come from simplification of the design, and elimination of the few parts that in a four-stroke motor can be rendered superfluous. Here the original scheme of the design is the governing factor. I have seen, for instance, in the Boudreaux-Verdet double-acting motor, no fewer than eight valves operated by a single cam, by an arrangement of rockers, tappets, and arms on those tappets. You would have to halve this, of course, for ordinary single-acting aero-motor practice; and then it would only apply to an opposed horizontal type. But then Verdet was one of those quaint Gauls—you read his psychology by his hat—who belonged at his best to the renaissance period, and was always trying to get eighteen pence out of the motor shilling by some terrific ingenuity.

Common persons like ourselves, however, must be content to do our best with a single tubular tappet and a folded steel rocker to work a pair of valves; with certain nut-and-bolt eliminations, as by casting progressive parts of manifolds integral with cylinders: with perhaps a couple of stout intermediate colonettes holding down a pair of cylinders by way of a one-piece spider-yoke gripping the heads of that pair, instead of the usual four colonettes per cylinder; and such like tricks of the Motor Artifex. And there is just one way of doing without either method, and knitting cylinders and crank chamber and the parts thereof all together without a single bolt. But how—is tellings. And it is some special milling job, anyway. Also, we can trim to the very bone here, have a tooth out there, so to say, by way of sweating off ounces as for a Stewards' Cup ride. Then our motor-training ends, and we need beware lest we have trained it so fine that it is short of strength, and so finishes down that course where the bookies are Bosches.

Whereas for radical weight-shifting down to 3 lbs. per b.h.p. or less, we must really forsake the four for the two-stroke practice. Wherein incidentally, inside the pale of a working stroke per revolution, each design has a special working cycle of its own, to make things happy. By which cycle—and the treacherous simplicity thereof, being nine-tenths obscure physics and one part super-sublimated mechanism—either the motor works like a dream or it refuses to run at all.

But here all the more, the natural weight gift of the air-cooled motor scores for success. For the cohesion-of-material factor being just where it is—and where it stops, practically—that two-for-one explosion shock element has to be met with double strength, to be got somehow; honestly if possible.

On Kemp Construction.

Thus the construction of the Kemp aero-motor's crank chamber has something to work upon. Made of one of the good trade alloys—few American or European stock types can really pretend to anything more special for many excellent reasons—it is nevertheless well designed to retain the desirable circular section; segmented out, of course, N.E. and N.W. in the case of the V type, and on the top, in the verticals. Internally it is well braced with the usual transverse webs that carry the journal housings; and is formed at the ends to take two large ball-thrusts which take the thrust from either end of the motor. There is a web and a bearing between each crank, making five for the eight and the four-cylinder models, and seven for the six-cylinder H.6.

Contes Droles Americaines.

As to the crank-shaft, its probable excellent quality—it is of vanadium steel and of fairly large diameter, considering that it is not hollowed—appears to lose rather than gain by fallacious embellishment. We learn that it is machined from the solid billet, blocked out, rough turned, heat treated, and ground to a final finish. Doubtless all very well, though the best people grind almost to the final tolerance before "heat treating" or surface toughening of any kind, and merely dress-polish at the last to avoid interfering with the skin. It is quite true that this ensures an absolutely flawless shaft, with forging strains eliminated entirely.

But flawlessness is not the whole story of perfection. One likewise ensures a much weaker shaft, because the grain does not follow the shaft run—especially in the case of a solid shaft—than if those highly assumptive, not to say imaginary, forging strains had not been eliminated. A shaft so much weaker, in fact, that unless it is made altogether heavier than it otherwise need be, it is positively dangerous in a six or twelve-cylinder V, even with a bearing between each crank to eliminate whipping—as far as possible. Really, I think they know more about these points at Sheffield—especially Wincobank way—than Muncie, Ind., can ever tell us.

Some Alloy Truths: and a Claim.

As to the connecting rods also, which are made of aluminium bronze of H section, with a central rib for those of the eight-cylinder, you have got to show more than the that's-so statement that they are equal in strength to steel forgings and will not crystallise under continuous use—before you will get practical men to believe it, on a weight for weight basis or any other.

The metallurgical evidence, in fact, is all to the contrary. There can certainly be no bronze without some copper in it. And some little experience of quaint alloys of aluminium specially devised for—and getting—enormous tensile strength, molecular cohesion, and freedom from crystallisation, has assured me that the moment you introduce any copper before or after the main melt, directly or indirectly, you immediately give the resultant alloy an assuredly short lifetime. At any rate, for functional work like that of a connecting rod, to a fatal degree. Or for withstanding sustained internal pressures or friction: albeit for crank chamber and like purposes other qualities of copper might well be advantageous in many ways.

On the other hand, the nickel-percented motor babbitt with which the connecting rod ends are bushed and lined, that is also the material of the crank-shaft bearings, has a better co-efficient of friction—or absence of it—than most bearing bronzes. Especially under a constant load does it appear to require less oil; so that it seems well chosen for aero-motor fitting; all the more when the lubrication system gets there catch-as-catch-can for simplicity; as in the Kemp, to be quite candid.

The cam-shafts of the Kemp motors are machined out of nickel steel and their cams treated to glass hardness. In each model the shaft runs in bearings on either side of each cam, bronze bushed. But whereas in the V type and four-cylinder vertical, it is completely crank chamber enclosed, it goes naked between bearings in the H.6 in the old-type Daimler fashion ere sleeves were worn. Which, if it does not save weight, at least helps a quick take-down if and when needed, and so may be as well as not.

On the other hand, why the gearing in all the Kemp models should wear nothing but wind and its own teeth, when it might have been cleanly enclosed in an oil-bath casing, I cannot imagine. The rest of the valve gear outfit is normal enough, the only departure being that the inlet valves in the H.6 are automatic; with, I dare say, a result as good as Anzani's and other apostles of motor-cycle practice.

The Question of Lubrication.

The Kemp motors depend for their lubrication on a system which is a combination of splash for the cylinders and delivery-and-fall, rather than force-feed, for the shafting and bearings. For the oil-sump holds four gallons of oil which is simply pumped up and positively delivered for distribution upon each bearings, while the connecting-rod big ends, continuously dipping into the over-fall, splash the oil to at least one side of the cylinders.

For which last reason, the system is wholly insufficient, except by luck, probably dirty, and certainly not economical. If there is one motor more than another which needs positive and even forced feed to delivery points at least half way up the cylinder trunks, it is an air-cooled one. Just because it is air-cooled, and for that reason oil-cooled to a greater extent than a water-jacketed one.

If, too, there is one type of motor in which the large-internal-content, easy-delivery possibilities of the centrifugal force-fed system, should be best displayed, it is an air-cooled aeromotor, because, being air-cooled, it needs a thicker-bodied lubricant of the highest possible heat-resistance, as long-distance motor-cycle racing has long since shown conclusively.

Such an oil has naturally a slower viscosity, however clean and clear; and therefore needs the large sources and conduits provided by hollow crank-shafts, connecting rods and gudgeon pins; channels of a wholly greater content and easier distribution than even the most direct outside pipings afford.

So to perfect the air-cooled type—or improve it as far as may be—for aviation purposes, its design should, in my opinion, *essentially* include a centrifugal lubrication system, with an extra-sized delivery pump, assisted by an efficient sump-drainage pump.

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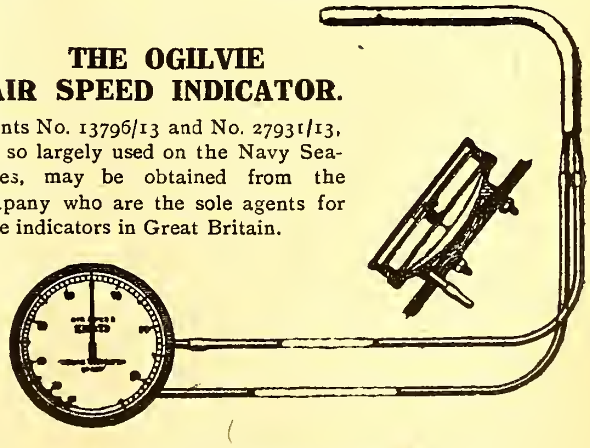

THE BRITISH WRIGHT CO., LTD.,
33 CHANCERY LANE, LONDON.

If only for economy's sake, is it not plain that the faster the oil is driven over the cylinder surfaces of an air-cooled motor, the less chance it gets to burn, and the greater to do its work efficiently? So opposed indeed are the facts of the matter to the sort of haphazard practice used in more cases than the one under review, that one wonders why motor designers do not appear occasionally to consult an oil-man.

The Notable Kemp Finish.

But the finish question in the case of the Kemp is, on the other hand, as studiously thought out as the air-cooling. One cannot praise it more highly. For the cylinders and all exposed parts are actually nickel-plated, cooling fins and all. The makers admit that this retards radiation as much as a fraction of one per cent. On the other hand they maintain—and I with them—that the greater ease of keeping all radiating parts and surfaces clean, and free from rust, more than makes up for this loss, and further assures, more than anything else can—apart from their own air-distribution system — maximum radiation efficiency at all times, in all circumstances.

For the upkeep care of the matter—the grooming, so to say, of the motor—amounts to nothing more than ten minutes' drawing a cotton rag over and between the fin surfaces every other day or so in fine weather. Whereas the proper cleaning of the ordinary polished or unpolished air-cooled cylinder is such a lengthy affair that there is seldom time for it. And this sort of finish certainly appears to exist all over the Kemp motor.

Accessory Details.

The choice of accessories, too, as well as their local lodgment, has been well done in the Kemp designs. The carburettors are Zenith or Model L. Schebler's, which call for no comment. But the use of the Mea BH.8 magneto for the J.8 seems particularly judicious, as this make is known to deliver the same spark regardless of slight vagaries in timing—which so notably upset other h.l. types—or sudden changes of speed. All of which assists flexibility, smooth running, easy starting from cold, and maximum h.p. delivery; as need hardly be said. Actually, this result is due to the wide range of advance, and advance with the field coils simultaneously with the timer at that; thus ensuring the hottest spark at the designed firing moment. However, Bosch plugs are so far the standard accompaniment.

For the rest, there seems to be no special point in fitting a six-cylinder motor of no more than 55 h.p. to an aeroplane. There are more powerful fours, many times more compact. When even an 80 h.p. eight-cylinder V is to-day almost outclassed except for a school machine, or the civil, private and commercial purposes for which the air-cooled type—none so much as the Kemp—seems so obviously better fitted—the six-cylinder of this type appearss most in place, for a hydroplane's or shoal-water craft's propulsion.

Possibilities.

But as to the V-type, in eight cylinders or a possible dozen, the special air-distribution scheme of the Kemp design, appears to give such renewed possibilities to the air-cooled type, above the previous 10-h.p.-per-cylinder accredited maximum, that it might well rise to 15 h.p. by the same mechanical developments and changes as have been effected in the water-cooled type. So by the closest adherence to Kemp air-cooling special principles, anything from 120 h.p. to a maximum of even 200 h.p. appears to be a reasonable expectation of the early future. That is why I still maintain that they—and the Kemp design in general—are better worth the—er, adaptation, of British aero-motor makers, than anything we have seen from America or the Continent so far.

(*To be continued.*)

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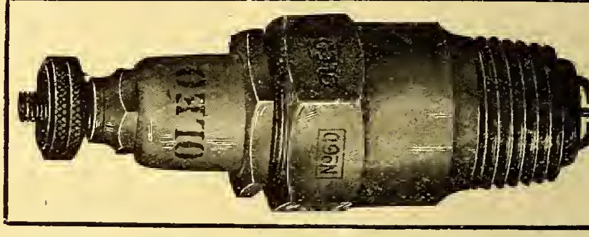

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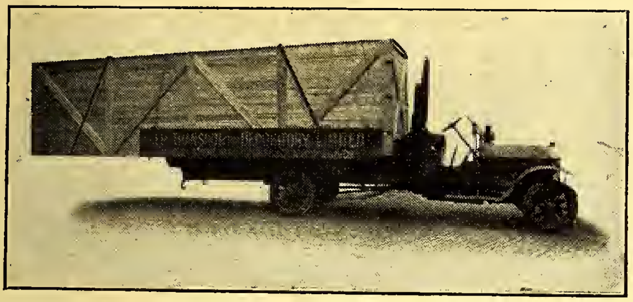

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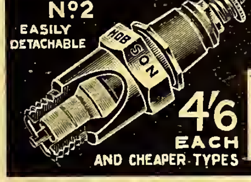

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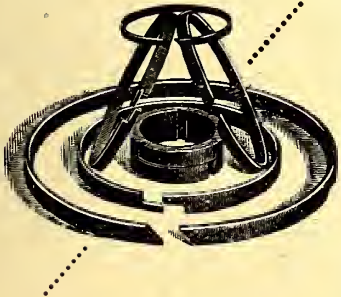

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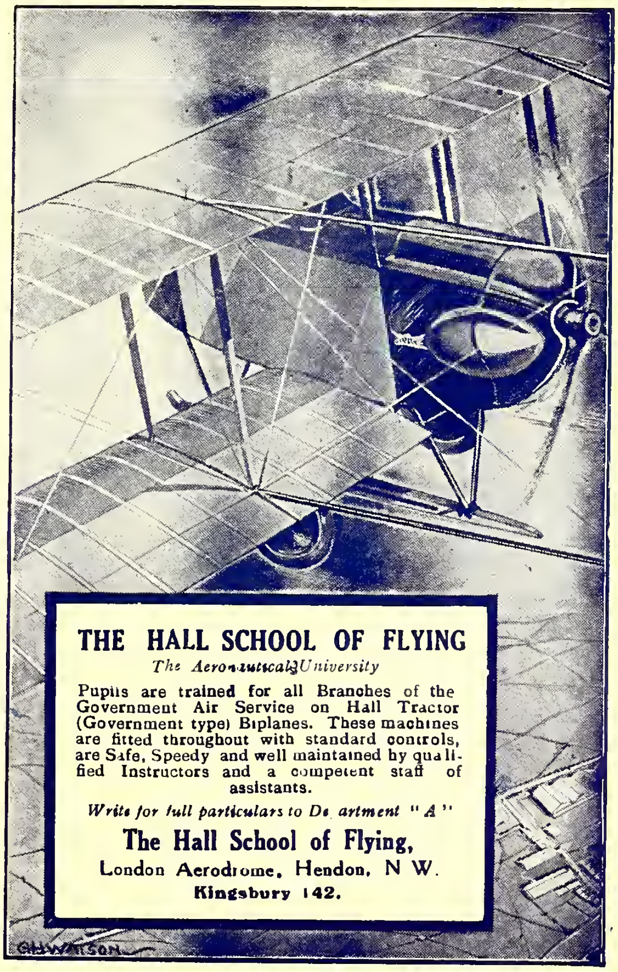

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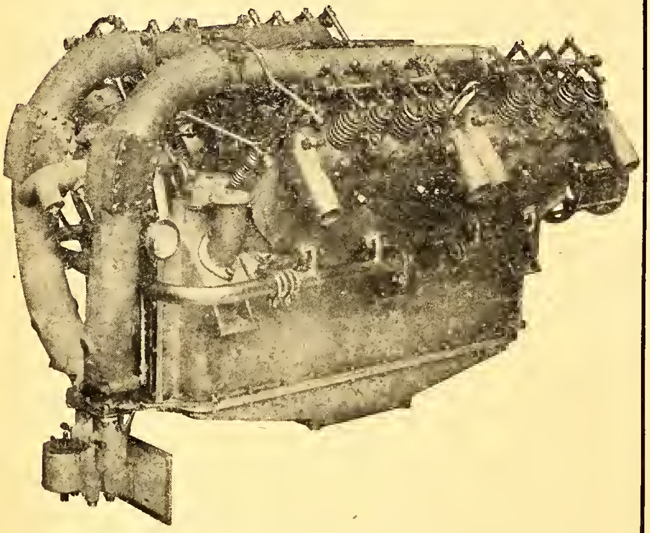

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ON THE APPENDICES TO THE REPORT OF THE R.F.C. ENQUIRY COMMITTEE.

When the Final Report of the Committee on the Administration and Command of the Royal Flying Corps, etc.—as it was officially called—was published in this paper, it was noted that certain appendices by Mr. Charles Bright, F.R.S.E., M.Inst.C.E., and by Mr. J. G. Butcher, K.C., M.P., were of such importance as to deserve special discussion, apart from the rest of the report. It is now proposed to deal with these.

The first is entitled :—

MEMORANDUM FROM MR. CHARLES BRIGHT AND MR. J. G. BUTCHER.

We desire to express our dissent from that portion of the Final Report which states (paragraph 44) :—"We think the reason why the R.A.F.-Napier engine was selected for the gamble was because it was—at any rate, partly—of R.A.F. design, and that this is an instance in which great reliance has been placed in the R.A.F." This view is not, in our opinion, established by the evidence.

Difficulties had occurred in the production of the Rolls-Royce engine as mentioned in paragraph 123 of the Report, though more fully set out in the evidence on the 15th day of our enquiry. This evidence makes it clear that not one of the three firms approached by the Directorate could come to a mutually satisfactory arrangement with the Rolls-Royce Company for the construction of their engine. It was for this reason that General Henderson did not give large orders for the Rolls-Royce engine at the time when he gave large orders for the R.A.F.-Napier engine.

In the circumstances, we think that, in giving these orders for the R.A.F.-Napier engine, General Henderson acted rightly.

Charles Bright.
J. G. Butcher.

[It would appear from this that Mr. Bright and Mr. Butcher, with knowledge of the terms which the Rolls-Royce Company sought to enforce, considered that it was better to take a sporting gamble on the R.A.F.-Napier engine than to exercise the powers obtainable under the defence of the Realm Act, adopt the Rolls-Royce designs and compel an arrangement of terms.

The subject would be an interesting one for debate, if one had full knowledge of the aforesaid terms. So far as one can gather, the R.A.F.-Napier engine is not yet in use as a standard type, even to-day, something like eighteen months after its first appearance as a manufacturing proposition. On the other hand, the Rolls-Royce is doing quite good service.

The Germans know more about the Rolls-Royce than do the aircraft constructors of this country, thanks to certain regrettable incidents which delivered a brand-new F.E.2d and a Handley-Page biplane into their hands. Even if the machines were damaged, as they do not appear to have been, the engines cannot have been destroyed. The captors are under no obligation not to break certain seals except in the presence of a Rolls-Royce engineer, as appears to be the regulation in this country, therefore presumably the Germans know what is inside the engine.

Nevertheless, without knowing anything of the internal economy of the Rolls-Royce, one can say that it is a good engine. Therefore it would seem that General Henderson would have done better to have enforced the construction of numerous Rolls-Royces, terms or no terms.

It is true that at the time both the R.A.F.-Napier and the Rolls-Royce were unknown quantities, but, comparing the record of previous R.A.F. engines with the record of Rolls-Royce car engines and the bench-tests of the same firm's aero-engine, which, I believe, actually existed at the time, most people would have felt inclined, on pure book form, to back the Rolls-Royce.

A Stable Tip Gone Wrong

One therefore assumes that General Henderson, not being himself an engineer, backed the stable tip of his advisory "experts" rather than exercise authority to break down any disagreement as to terms between rival manufacturers.

As a rule it is safer to back public form than stable tips, especially when public form is consistent. There has been no "in and out running" so far as R.A.F. engines have been concerned, for their running has been consistently "out," and the tip straight from the horse's mouth, as in this case it seems to have been, only emphasises the unreliability of the horse. Therefore it is a trifle difficult to agree with the memorandum, if one considers the powers which might have been put into operation.

If, on the other hand, one omits to reckon on those powers, one can agree that General Henderson acted rightly in taking the path of least resistance.

A Moral to the Tale.

This little incident should be of high educative value to the new Air Board, in that it shows the harm which may be done by not taking all available advice on matters affecting supplies.

"The deciding authority, who knows nothing at all"—to adopt Lord Sydenham's famous epigram—may be all the better for having a perfectly open mind, if he will make perfectly certain of hearing all sides, and of not banking entirely on the advice of official experts, "axe in hand to the national grindstone"—as General Henderson once put it. *Littera scripta manet.*

As to present and future R.A.F. engines, one hears so much of the cleaning of the Augean Stables by the new Superintendent that one hopes to learn in time that the whole junk-heap of obviously futile experiments has been cleared out, water-cooled, air-cooled, Vs, radials, rotaries, cast iron, steel, aluminium, and all, and their comic designers with them.

When they have all been successfully melted down for more useful purposes, and their designers have been put to some useful win-the-war employment, such as digging drains, a new staff with a genuine workshop experience—railway-shop experience for preference—might be engaged, and a series of sane, practical experiments could then be begun. To which experiments one wishes every success.

There is a vast field of utility for the R.A.F., both as an experimental and as a productive establishment, when once Mr. Fowler is able to remove the idea that the place exists only to steal the ideas of independent designers. He can only remove this idea by ridding the place of all those whose behaviour, possibly merely injudicious or tactless—as General Henderson admitted—gave rise to this idea. Even quite recently one has heard that people with designs or schemes to submit are not convinced as to the treatment they will receive from subordinate officials, and this feeling of suspicion can best be abolished by making a clean sweep of all those who held office under the previous régime. The result may be unjust to some people, but, like many another surgical operation, the end will justify the means.]

FURTHER MEMORANDUM FROM MR. BRIGHT AND MR. BUTCHER.

Since the issue of our Interim Report attention has been called to the finding of the Royal Aero Club's Public Safety and Accidents Investigation Committee regarding the fatal accident to Lieutenant Desmond Arthur. It is to be regretted that the said Committee's Report—and the evidence on which it was founded—was not brought to our notice by any witnesses dealing with the subject during the course of the enquiry.

Whilst we have not had the opportunity of testing the evidence on which the Committee's finding was based, it now appears to us to be more than likely that at least one highly defective repair had, in actual fact, been made at some time or another to the machine. There is, however, no evidence to show where or by whom.

In any case, it seems to have been effected by some unauthorised person—certainly by an unskilled hand. It appears probable that the machine had been damaged accidentally, and that the man (or men) responsible for the damage had repaired it as best he (or they) could, to evade detection and punishment.

In making this statement we are taking the first suitable opportunity of amending—so far as we personally are concerned, and to the extent indicated—what appears on pages 7-8 of the Interim Report regarding the last case dealt with.

We desire further to express our complete sympathy with the resultant recommendations of the said Committee as expressed in the following terms:—

> "The accident points to the necessity for expert superintendence of every repair, however slight, of the structure, and independent inspection of such repair when completed, full details being recorded in the history sheet of the aircraft. After any important repair to the structure has been made, it should be so marked that both the workman by whom it was done and the examiner who subsequently passed it fit for service can be identified."

This accident occurred, it will be seen, in comparatively early days—well before the war—and the above recommendation has, we understand, since been in effect generally enforced.

CHARLES BRIGHT.
J. G. BUTCHER.

[The only comment one need make on this Memorandum is that it confirms the opinion expressed in this paper at the time concerning the verdicts of the Committee on sundry others of the so-called "Murder Charges," which one would prefer to style Avoidable Accidents, namely, that while the Committee did their best with the evidence before them, the evidence was insufficient to convict or acquit.

The Interim Report, with which this Memorandum disagrees more or less, was brought out in a hurry, apparently officially urged forward by the hope of suppressing the insuppressible Mr. Pemberton-Billing, and in arriving at its verdicts the Committee were under the very great disadvantage that they could not subpœna witnesses, and that while official witnesses in defence of officialdom were very ready to come forward in plenty, there was a natural reluctance on the part of junior officers, and officials, and of people in the Aircraft Industry who live by official goodwill, to come forward and give first-hand evidence.

Consequently one is only surprised that the Committee arrived, on the whole, so near the truth in so many of their judgments. Mr. Bright and Mr. Butcher are to be congratulated on having the courage thus to admit that in even one instance the Committee failed to secure evidence which was easily available.

Following on these joint memoranda is a long list of Recommendations by Mr. Bright alone, which are of such interest from the point of view of both the Flying Services and of Aeronautical Engineering that they deserve to be the subject of a separate discussion, for which there is no room in this issue of THE AEROPLANE. One hopes, therefore, to deal with them in a manner worthy of their importance next week.—C. G. G.]

TRAINING.

BY "BERKELEY."

"Everything," said Clausewitz, "is very simple in War, but the simplest thing is difficult."

Those for whose protection the armed forces of the nation exist are always unready to admit any degree of specialised knowledge to the soldier, other than an over-zealous acquaintance with the time-worn maxims of drill-books, in which the words are uninspired, but of which the result is beauty.

A doctor of medicine takes seven years to train before he is permitted to exercise his skill upon the unwary and the unfortunate. A dentist, a butcher, a mining engineer, a dressmaker—in fact, every profession, every business in life, save that of an editor, requires training before its profitable practice is possible. The Man in the Street knows this to be true, and admits it to be true, but he cannot be brought to understand that a soldier, if he is to do his work with efficiency, must also be educated in military science in no less a degree than are these others in their own chosen subjects.

STANDING ARMIES.

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our hastily raised and hastily semi-trained civilian levies in the battles of the past two years. It is not the first time that gallantry has been confused with efficiency and large numbers with success.

It is not realised that, had Great Britain maintained a standing army of at least two millions since the days of the war in the Crimea, the present conflict might have been averted, and, if not averted, would have ended with far less expenditure in men and money than has been the case. Even those who have some inkling of the probable truth of this statement are not always ready to appreciate the depth and breadth of the science of war. All parts of life find a place in war; no subject fails to contribute its share to the methodical settlement of international argument by means of co-ordinated force.

If the new armies have done well with their inadequate military education, how much greater would have been the profit consequent on previous preparation, mental and physical? The power of all ranks to work together in mutual confidence, if it had been present in the days immediately after the almost total disappearance of England's historic Regular Army, would have altered the entire course of the campaign. To-day it is coming to pass, and the change in *moral* will not make the task of the Central Empires any lighter, nor will it add brightness to their prospects, even of averting total defeat.

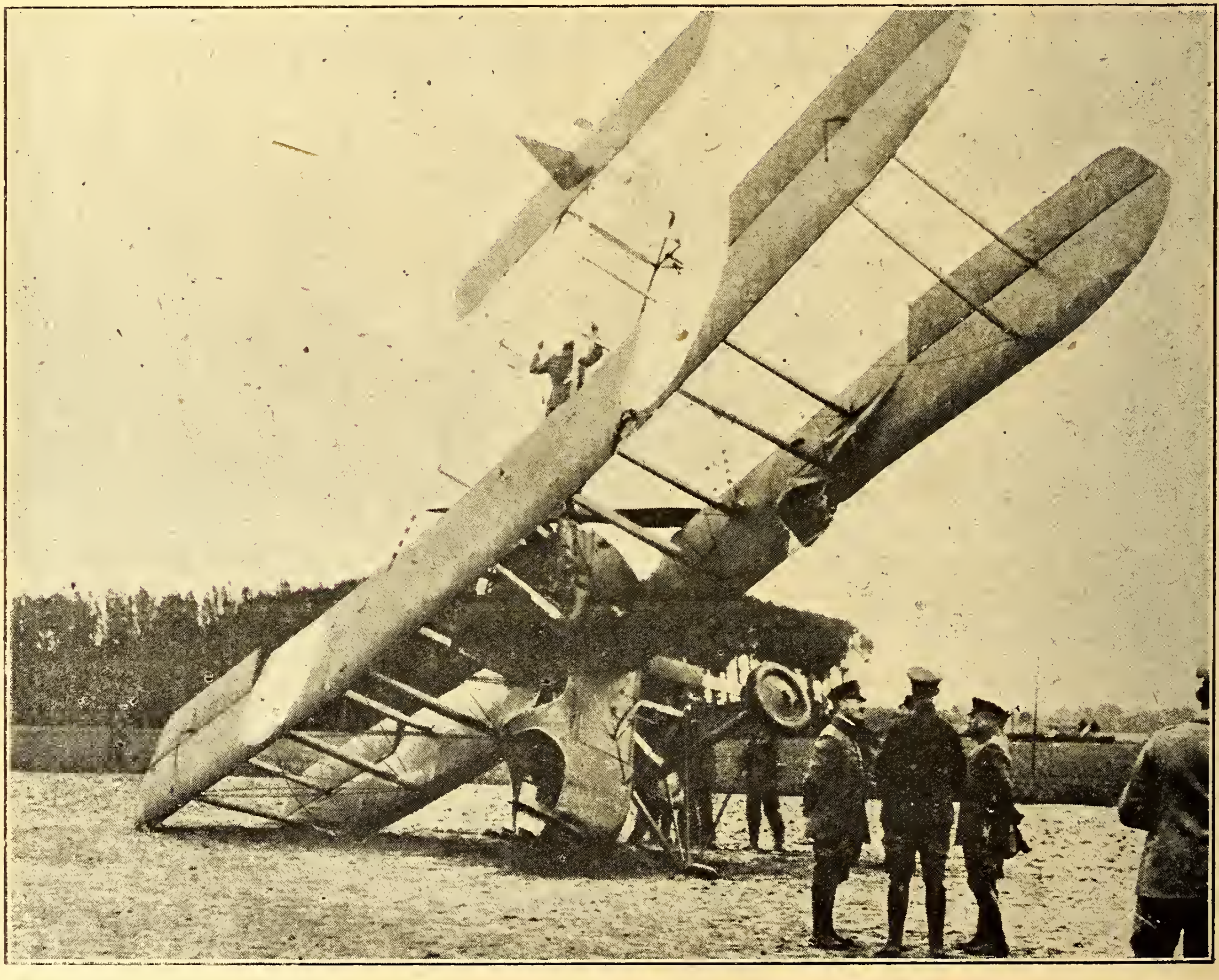
LEADERSHIP.

Leadership of men, while it is the foundation of military life, needs a vast house of training to be built upon it before the end aspired to is attained. The power of leadership is born in some; in others it is maintained by the system. Therefore, it is proper to see that the system is perfect, and that it is understood by all.

No nation is superior to our own in its system of military science; no nation has less exponents of that system, save, perhaps, the United States of America and a few other minor Republics. Such as there are stand high in their profession. That the original army was highly trained is clear from the manner in which the knowledge of the few has been distributed with fair success amongst the many.

An infantry officer, who was popularly supposed to know little beyond ceremonial, the price of cigarettes, and the design of kid gloves, must in addition to a deep acquaintance with the principles of strategy and tactics have a close knowledge of all that concerns the comfort and physical well-being of his men. The mysteries of civil and military law must be unsealed for him, and even the basic rules of sanitation present no terrors other than the possible necessity of having to put them into practice.

The approach of decay in the daily meat is clear to his discerning eye, and his literary sense is educated to the degree of writing a service letter, by no means the least abstruse of documents, with propriety and clarity of expression. The width of a halfpenny piece and the pleasures of panoramic sketching under enemy fire and pouring rain have each a value to him in the passage of his life.



REPORTED MISSING.—A British Army biplane in the hands of the Germans near Lille. The official account states that it is not evident what became of the crew. It will be remembered that an F.E.2d. biplane with 250-h.p. Rolls-Royce engine was captured at Lille on May 31st, 1916. The crew was captured.

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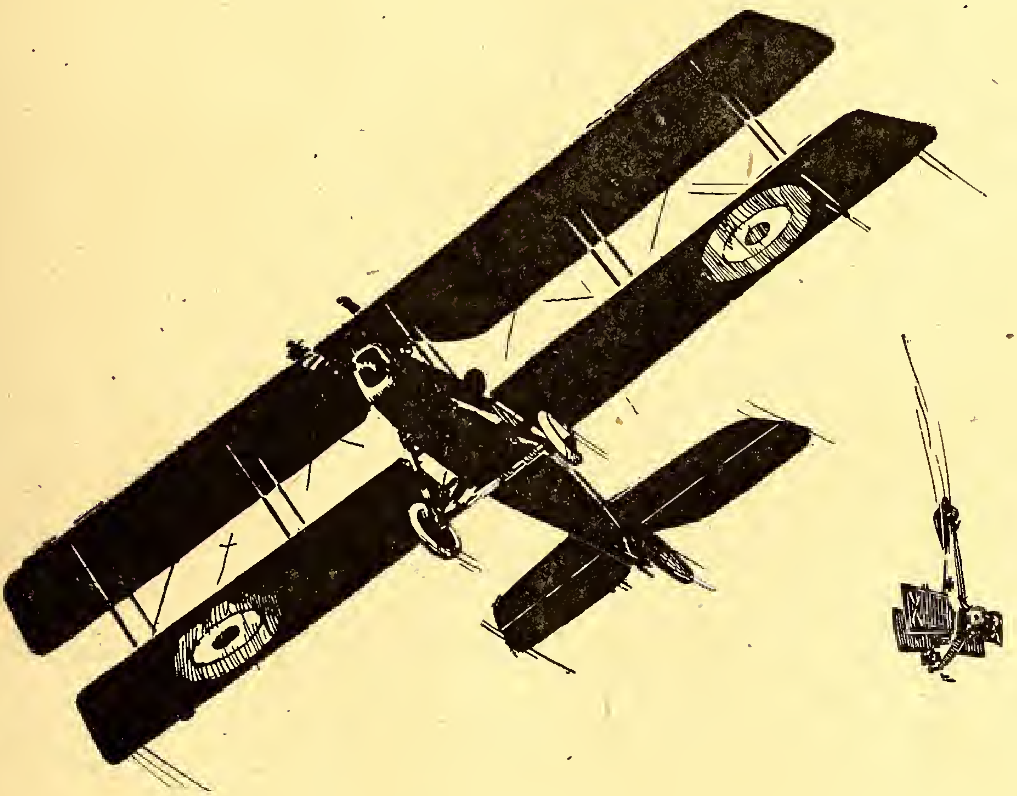

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The other branches of the Services have each their particular horrors for those whose youth is dedicated to the military life. The sapper revels in drains and railway bridges when he is not unravelling the intricacies of barbed wire under the interested musketry experimentation of an intelligent if misguided enemy. The gunner whose duty it is to educate that same enemy in the devastating effects of intensive fire must first become friendly with Infinitesimal Calculus no less than with the dullest text-books on Gunnery that have added to the troubles of man since the publication of the first Manual of the Catapult, which one might have expected King David to edit. Even the cavalry were subjected to military education in the later days of enthusiasm.

Enough has been said to show that, if similar efficiency is to be attained in the R.F.C. to that common in other arms of the Service, the officer under training must be educated in much more than the technicalities of flying. It is to be presumed that, on the return of peace, officers in the Royal Flying Corps will of necessity be submitted to the same trials as befall the officer of other arms in the way of promotion examinations and other inventions of those who sit in judgment.

GOOD FORM.

It would appear profitable if the officer personnel of the Flying Service were to receive a part of the training of the infantry officer, as being the arm resting least on special technicality. The knowledge necessary to officers of marching regiments forms a good foundation for any system of military science, and two years spent in a line battalion are a liberal education to all possessing intelligence.

The foundation of military virtue is acquired imperceptibly and with certainty. A sense of what is proper to the military caste becomes a part of life. Good form cannot be taught; it must be absorbed from heredity or from the imitation of a good example. The knowledge of all that tradition implies comes with life in a historic regiment and as part of the spirit which has held the borders of the Empire inviolate throughout the years.

There is no reason to assume that the higher command of the Royal Flying Corps do not appreciate the necessity for training in the military virtues, but there is every reason to believe that a great number of those who select military aviation as a career in life are under the impression that the acquisition of the palms of popular heroism is their duty in the future.

Cadets under training, even in these strenuous times, when it is the minimum training necessary, rather than the maximum possible, that counts, can do much to supplement their knowledge by reading eminently dull but highly valuable manuals on the groundwork of the Art of War.

Officer aviators are employed largely with a view to observing movements of the enemy. If they know why and how various common movements, tactical or strategical, are made in war, they will have taken the first step towards seeing such moves when they are fortunate enough to fly above at the proper time. They will not only know what the alphabet looks like, but will understand what it means.

With knowledge will come fascination, and the dullness will disappear from the text-books because comprehension has come.

Success in the Army in ordinary times is a question not of fortune or favour but of hard work.

[The author entirely disclaims all responsibility for his Editor's beliefs or opinions.—" BERKELEY."]

Failed to Return.

Owing to the arrival of war while aviation was in its infancy, and because it has not yet passed the stripling stage, it is inevitable that many Allied aeroplanes must fall into the hands of the enemy on the Western front.

The prevailing winds in France do not favour the Allied aviators, whose missions take them far greater distances over enemy country than the German aviators usually have to travel.

Another difficulty is the necessity for budding aviators, both Naval and Military, to make their maiden flight across the Channel, where the wind is peculiarly erratic, and it is apparently the easiest thing in the world to mistake certain Belgian seaside resorts in the hands of the enemy for coast towns in France. It is no reflection, therefore, on either of the British Flying Services that the Germans are accumulating quite an interesting, and almost representative, collection of British seaplanes and land machines.

There is no need, nor, indeed, might it be advisable, to give a catalogue of the aircraft which have so miscarried. Unfortunately, certain aeroplanes and seaplanes thus annexed by the enemy have been extremely up-to-date, and although it would be insulting the intelligence of the German aeronautical laboratories to suggest that they are very far behind us in aeroplane design, it would be equally insulting their intelligence to infer that they do not take advantage of any British contribution to the science of aerodynamics which may have escaped their previous notice.

It is therefore seriously to be hoped that effective measures have been taken for the provision of the means of ready destruction by the pilot of every aeroplane which has to come down in enemy territory. In the olden times, the customary method of scuppering an aeroplane which ran imminent risk of being captured was for the pilot upon landing to fire his revolver or automatic into the petrol tank to let the petrol out, and then to fire at close quarters into the stream of liquid as it issued from the tank, and so set the whole machine ablaze. Theoretically, this method was quite effective. In practice, it cannot have been particularly certain, because although British pilots who fly into the hands of the enemy undoubtedly do their best to destroy their machines, there is pretty clear evidence that the Germans are in possession of many British aeroplanes in the pink of condition.

In the case of the capture of standard machines, their reception by the enemy is not of very great importance, except in so far as it provides the enemy with a new school machine, as apparently he is not too proud to devote such acquisitions to this purpose. When, however, a really up-to-date aeroplane goes east and stops there, it is a very much more serious matter, and it is expedient that the machine be destroyed at all hazards.

The measures taken to this end by the authorities may not, of course, be stated in print, but the following suggestion seems to present a simple method of turning perfectly good aeroplanes into a bonfire which may not have been tried out in practice.

It is well known that phosphorus is a metal which oxydises with the greatest violence in air at normal temperature. Consequently it has to be kept in some such liquid as oil to preserve it from contact with the oxygen in the air, and when placed in the open air it catches fire spontaneously, developing intense heat. It is also capable of being dissolved in carbon bisulphide, an extremely volatile solvent which evaporates on the slightest excuse. It seems only necessary, therefore, to provide each and every machine used for war purposes with a smash-proof flask holding about a quart of this solution, with an air-tight, but readily detachable, stopper, to make destruction easy at a moment's notice.

In the event of an uninvited landing, the pilot would merely withdraw the stopper from the flask and pour the contents in and around the cockpit, and, if time permitted, along the wings. Nothing would happen for a few minutes until the carbon-bisulphide evaporated, and then the machine would suddenly burst into a blaze which nothing would quench.

The obvious objection which will be raised is that the average aeroplane is quite sufficiently dangerous, from the pilot's point of view, in the event of a bad landing, through fire from the petrol tank, and that the presence of phosphorus in a machine would only make the consequences of a fall still more serious, but it is quite clear that so small a vessel as would be required to contain the solution could be made sufficiently strong to withstand puncture in the heaviest of falls the machine could possibly endure without the crew being irretrievably damaged.

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In the event of a landing in hostile territory, the pilot is quite likely to be threatened with death by his captors if he persists in attempting to destroy his machine, but this risk seems well worth while if the aeroplane is of an important type, details of which must be withheld from the enemy at all costs.

It has been a tradition both in the Navy and in the Army that surrender must not be entertained for a moment if the enemy is to receive any further advantage than that derived from the actual personnel captured. For instance, no battalion-commander would permit of surrender, however hardly pressed, did he know that his support trenches had been wiped out by artillery fire, and that the enemy could force an important position by capturing his battalion. In a similar way, the commander of a British warship would let his ship sink under him rather than surrender if he were the only obstacle to a surprise raid on our coasts. As a matter of fact, the surrender of a British warship in modern times is almost inconceivable, and with justice to the enemy it must be said that the same tradition applies to almost the same extent with his own navy.

There is a story that in the early days of submarine warfare, when the insides of German submarines were more or less a secret to the British Navy, a German submarine was driven into some shallows from which it could not escape. The skipper of the British ship which had been molesting her signalled by wireless to the submarine that if the crew did not surrender he would "blow them to hell." The only answer he received was, "Blow us to hell, then"—and he did.

There seems to be no doubt, therefore, that every advantage would be taken by the crews of aeroplanes in both Air Services of the most effective means with which they could be supplied of destroying their craft in the event of capture—especially as capture is in many cases the result of a personal error of judgment on behalf of the pilot concerned.

That the most effective method for the accomplishment of this voluntary destruction has not yet been universally applied seems rather too clear from the German official report issued a few days ago that they have captured a British super-aeroplane. Unfortunately, this particular machine is one of the finest of its type in the world, and it is to be feared that the Germans—who have not hitherto been particularly successful in the construction of very large machines—will find inspiration in it for more effective efforts in this direction.—W. L. W.

[One may add that in neither Flying Service is there any lack of "dud" aeroplanes on which experiments in destruction and the drilling of pilots in the case of destructors might be carried out.—Ed.]

THE R.N.A.S. COMFORTS FUND.

Intimations are occasionally received by the R.N.A.S. Comforts Fund that certain R.N.A.S. units abroad do not receive any benefit from the Fund. Every endeavour has been made by the Committee of this Fund to meet the requirements of everybody concerned, but comforts are sent to those units which ask for them, and as the enormous amount of work entailed has in the past taxed an overworked and exceedingly small staff to its utmost, it is possible that various units which have not asked may have been overlooked. Under the new organisation it is hoped that any discrepancies of this nature will be rectified, and with this end in view Mrs. Sueter, the hon. treasurer, will be glad to hear from units at home and abroad to whom the Fund can be of use.

Mrs. Groves, who has done good work for the Fund, has unfortunately been ill for some time, and has had to resign her place on the committee. The sympathy of all those who appreciate the work which the Fund has done will go to her.

A donation of £3 from Mrs. S. V. Coote brings the total received to date to £2,608 11s. 2d. Further contributions in cash or kind should be sent to Mrs. Sueter, The Howe, Watlington, Oxon.

THE ROYAL FLYING CORPS HOSPITAL.

The committee of the Royal Flying Corps Hospital, 37, Bryanston Square, W., find that the present accommodation is insufficient to provide for the increased number of sick and wounded officers, due to the great expansion of the Corps, the development of aerial fighting, and the physical effects of constant flying at great altitudes.

Hitherto the hospital has been supported by private contributions from a limited number of those who are interested in the Royal Flying Corps, but as additional accommodation has now been secured, the committee desire to make its wants more widely known in order that they may be able to make suitable provisions for pilots and observers who are wounded or injured in the course of their splendid work. Contributions may be sent to the honorary treasurer at the hospital.

THE AERONAUTICAL PICTURE SHOW.

The exhibition of pictures at the Grosvenor Galleries which is being organised by Lady Drogheda promises to be one of the most successful efforts ever made in aid of war charities.

The exhibition is historical in character, and is intended to portray the progress of aeronautics from the earliest times to the present day.

The arrangement of the galleries has almost been completed, and the last batches of the catalogue went to press last week. An announcement of the opening date may have been made by the time this paper is in the hands of its readers, and Bond Street should be very busy while the exhibition is open.

The foundation of the exhibition is the very fine collection of aeronautical pictures owned by Lady Drogheda, and this has been supplemented by loans from friends and from the technical and illustrated Press.

An advance inspection of the Galleries reveals the great amount of work that has been put into the collection and arrangement of the pictures and other exhibits. Various old prints and paintings are arranged in order of date, showing early experimental fire balloons and later gas balloons, early attempts at airships, the use of the balloon as an attraction at fêtes, and afterwards in war. In a similar way the progress of the aeroplane is marked from the earliest times to the present day.

The history of parachuting is likewise recorded pictorially, with many diverting incidents connected therewith.

A proper inspection of the pictures would occupy many hours, and it is certain that many enthusiasts will be tempted to visit the exhibition several times.

In addition to this wonderful collection of paintings, prints and photographs, there are also a number of topical exhibits loaned by the R.N.A.S. and R.F.C. These include a Fokker monoplane with Uberursel engine, portions of the girder work and tanks of Zeppelins, a Zeppelin propeller, gas-valve frames, and the observation car dropped from an airship during a raid, which created so much attention in the general Press at the time.

Smaller articles associated with airship raids include the remains of bombs, binoculars, a machine-gun, and a few personal effects of deceased aeronauts which were too badly damaged to be worth sending back to Germany.

Other interesting objects are scale models of aeroplanes and seaplanes, and of kite-balloons and airships.

No one who takes the slightest interest in the development of aeronautics should neglect to pay at least one visit to the exhibition when it is opened. There is no doubt that the enormous amount of work undertaken personally by Lady Drogheda in this both artistic and philanthropic effort will be well requited by its success.—W. L. W.

THE ROYAL AERO CLUB'S NEW PREMISES.

The Royal Aero Club is now in its new premises at No. 3, Clifford Street, New Bond Street, W., and apparently the members appreciate the additional convenience of having comfortable bedrooms and proper feeding arrangements.

Naturally, for the first few days the catering was a little bit chaotic, but now things seem to be running quite smoothly, and the cooking is undoubtedly good. The club is really quite beautifully furnished, and though one perhaps misses the vast open space of the old club-room, whence, when one was tired of discussing theoretical aviation, one could look out of the window and study the birds up Bond Street, the general cosiness and comfort of the new rooms quite compensates one for the loss of scenery.

There are two dining rooms upstairs, with a comfortable lounge on the same floor for the benefit apparently of those who have done themselves so well that they are disinclined to travel downstairs to the main sitting-rooms.

On the sitting-room floor there is a commodious bar in which those so inclined can disport themselves apart from the more quietly inclined members who merely wish to read or write.

In the basement is an oak-panelled billiard room, which should also be popular.

The personnel of the Club Staff happily remains unaltered. Mr. Stevenson, most affable of secretaries, continues to administer the affairs of the Club. Miss Schutte, chief of the office staff, and an unfailing mine of information to all those who wish for historical facts or statistics connected with aeronautics, is happily still in charge of the business work of the club; and Mrs. Barrack, who attended so assiduously to the creature-comforts of the members at the old premises, continues her motherly ministrations under improved circumstances.

Altogether the club seems to have quite good prospects, albeit a number of possible members will undoubtedly be deflected from it by the advent of the Royal Flying Corps Club. There should, however, be plenty of room for both establishments, and the increase in size of the Aircraft Industry, together with the development of the sport of flying in the future, will certainly make the Royal Aero Club an establishment of considerable size in years to come, provided always that the committee does its duty energetically, and is not afflicted by somnolence, as has happened at times.

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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Jan. 16th, 1917.

Admiralty, Jan. 12th.

R.M.L.I.—The following are granted rank of Lt.-Col. whilst holding appt. of Wing Comdr., R.N.A.S. :—Capt. (temp. Major) C. E. Risk, Capt. (temp. Major) C. E. H. Rathborne (Dec. 31st, 1916).

War Office, Jan. 16th.

REGULAR FORCES.—Wt. and N.C.O.s to be Sec. Lts. for service in the Field :—

Memoranda.—For duty with R.F.C. :—Pnr. E. W. Swann, from R.E. (Dec. 19th, 1916); Cpl. E. C. Davies, from R.E. (Dec. 23rd, 1916).

REGULAR FORCES.—Establishments.—R.F.C.—The following appt. is made :—Flying Officer.—Temp. Sec. Lt. E. L. Hyde, Gen. List (Dec. 14th, 1916).

Infantry.—E. Yorks R.—Sec. Lt. C. R. Richardson is secd. for service with R.F.C. (Dec. 3rd, 1916).

Memoranda.—Temp. Sec. Lt. A. Berry relinquishes his commn. on appt. to Naval Air Dept. (Sept. 11th, 1916).

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. F. A. Crispin is placed on the retired list on account of ill-health (Jan. 17th).

Sec. Lts. (on prob.) are confirmed in their rank :—J. Ferguson, H. F. Wilkinson, S. G. Elliott-Smith, C. W. Olliver, A. L. C. Hartland-Rowe, F. Stoner, J. E. Arnott.

TERRITORIAL FORCE.—Infantry.—Suffolk R. — Capt. F. Wyatt is secd. for duty with the R.F.C. (Nov. 30th, 1916).

Northumberland Fus.—Capt. E. A. Fawcus is secd. for duty with the R.F.C. (Dec. 30th, 1916).

Midd'x R.—Sec. Lt. D. C. Bell is secd. for duty with the R.F.C. (Dec. 28th, 1916).

Royal Defence Corps.—Lt. W. E. de B. Whittaker, The King's (L'pool Regt.), to be Adjt. and temp. Capt. whilst employed at Headquarters, Sept. 6th, 1916.

* * *

From the "London Gazette" Supplement, Jan. 17th, 1917.

War Office, Jan. 17th.

Memoranda.—R. H. Peto, late Sec. Lt., 10th Hrs., to be temp. Lt. for duty with R.F.C., Jan. 18th, seny. from Sept. 1st, 1916.

R. S. Owen, to be temp. hon. Lt. (without Army pay or allowances) whilst employed as an Asst. Inspr., Aeronautical Inspn. Dept., Dec. 1st, 1916.

Ord. Smn. C. J. Miln, from R.N.V.R., to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Jan. 1st.

* * *

A special supplement to the "London Gazette" issued on Jan. 17th contains a dispatch from General Smuts, Commanding the British Forces in East Africa, covering the period from March 21st—October 27th, 1916, in which he thanks the Air Services for the work they have done in connection with the campaign, the mention apparently referring both to the Royal Naval Air Service and to the Royal Flying Corps.

The citation is as follows :—"The work of the Air Services has been most creditable. In addition to their reconnaissance work there is evidence to the effect that both material and moral damage has been done to the enemy by their constant bombing raids."

* * *

From the "London Gazette" Supplement, Jan. 18th, 1917.

War Office, Jan. 18th.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdr.—The appt. of Sec. Lt. (temp. Capt.) A. S. C. MacLaren, M.C., K.O.Sco. Bord., Spec. Res., notified in the "Gazette" of Nov. 8th, 1916, is antedated to Oct. 1st, 1916.

Flying Officer (Observer).—Sec. Lt. E. R. Wilkinson, E. Lan. Field Co., R.E., T.F., is as now described, and not as in the "Gazette" of Dec. 18th, 1916.

Aeronautical Inspection Dept.—The follg. temp. appt. is made :—

Asst. Inspr.—Sec. Lt. J. A. O'Brien, Lond. R., T.F., from an Equipment Officer, 3rd Cl., and to be temp. Lt. (without pay and allowances of that rank) whilst so employed. (Dec. 11th, 1916.) (Substituted for the notification in "Gazette" of Jan. 4th.)

Memoranda.—Actg. Sgt.-Maj. T. J. Hudson, from R.F.C., to be Sec. Lt. for duty with R.F.C. (Jan. 19th).

SPECIAL RESERVE OF OFFICERS. — Reserve Units.— Infantry. R. Fus.—Lt. T. G. Skeats remains secd. for duty with R.F.C. (Jan. 1st).

TERRITORIAL FORCE.—Infantry.—Gordon Highrs.—Sec. Lt. (temp. Lt.) A. H. Stradling is secd. for duty as Adjt., R.F.C. (Nov. 13th, 1916).

London R.—Sec. Lt. F. E. Gritton is secd. for duty with the R.F.C. (Dec. 31st, 1916).

From the "London Gazette," Jan. 19th, 1917.

War Office, Jan. 19th.

REGULAR FORCES.—Q.M.G.'s Staff.—D.A.Q.M.G.—Capt. E. R. L. Corballis, R. Dub. Fus., from an Equipment Officer, 1st Cl., R.F.C., vice Capt. (temp. Maj.) A. Christie, R.A., Dec. 31st, 1916.

Attached to Headquarter Units.—Brig.-Gen. R.A.—Bt.-Col. (temp. Brig.-Gen.) E. B. Ashmore, C.M.G., M.V.O., R.A., and to retain his temp. rank whilst so empld., Dec. 20th, 1916. Brig. Comdr.—And to be temp. Brig.-Gen. whilst so empld.—Maj. J. H. W. Becke, D.S.O., Notts and Derby R., from Wing Comdr. and temp. Lt.-Col., R.F.C., vice Bt.-Col. (temp. Brig.-Gen.) E. B. Ashmore, C.M.G., M.V.O., R.A., Dec. 20th, 1916.

Establishments.—R.F.C.—Flying Officers.—Sec. Lt. J. E. Arnott, Spec. Res.; temp. Sec. Lt. (on prob.) G. Wood, Gen. List; temp. Sec. Lt. R. W. G. Morrison, attd. E. Surr. R.; temp. Sec. Lt. C. A. F. Rogers, Gen. List, Dec. 24th, 1916. Temp. Lt. A. P. Ravenscroft, R.A., and to be transfd. to Gen. List; Lt. K. MacKenzie, Seaf. Highrs., Spec. Res., from a Flying Officer (Observer), with seny. from July 1st, 1916. Sec. Lt. O. C. Bryson, Dorset Yeo., T.F.; temp. Sec. Lt. (on prob.) W. B. Ccoke, attd. E. Surr. R.; Sec. Lt. F. Stoner, Spec. Res.; temp. Sec. Lt. H. H. Maddocks, Gen. List; Lt. W. M. Fatt, Canadian Gen. List, Dec. 26th, 1916. Temp. Lt. L. J. Gulliver-Cradwick, Essex R., Sec. Lt. T. Barclay, High. L.I., T.F.; temp. Lt. T. G. Poland, attd. E. Surr. R.; Sec. Lt. R. M. Chaworth-Musters, Leic. R., and to be secd.; Sec. Lt. A. L. C. Hartland-Rowe, Spec. Res.; temp. Sec. Lt. S. E. Dreschfeld, Gen. List, Dec. 27th, 1916. Capt. J. C. H. Storer, Canadian A.S.C.; Lt. M. H. Coote, R.A., and to be secd., Dec. 29th, 1916. Temp. Sec. Lt. G. E. Thomson, attd K.O.S.B.; Sec. Lt. R. H. Upson, R. W. Surr. R., T.F.; temp. Sec. Lt. H. W. Gammon, Gen. List; temp. Sec. Lt. P. Evans, Gen. List, Dec. 30th, 1916. Temp. Sec. Lt. H. Blythe, Gen. List; temp. Sec. Lt. A. Chapman, attd. E. Surr. R.; Sec. Lt. F. E. Gritton, 21st Lond. R., T.F.; temp. Sec. Lt. W. O. Cornish, Gen. List; temp. Sec. Lt. O. W. A. Manning, Gen. List, Dec. 31st, 1916.

Adjt.—Capt. G. D. Yeatman, Dorset R., from Nov. 1st to Dec. 24th, 1916.

Park Comdrs.—From Equipment Officers, 1st Cl.—And to be temp. Majs. whilst so empld. :—Capt. F. L. Scholte, Spec. Res.; Qrmr. and Hon. Lt. (temp. Capt.) F. H. Unwin, R.F.C., Nov. 1st, 1916. Qrmr. and Hon. Lt. (temp. Capt.) A. H. Measures, R.F.C., Dec. 6th, 1916.

Equipment Officers, 2nd Cl.—From the 3rd Class.—And to be temp. Lts. whilst so empld. :—Sec. Lt. O. W. Latimer, Gen. List, Dec. 15th, 1916. Sec. Lt. S. S. Dixon, Spec. Res., Jan. 1st.

3rd Cl.—Temp. Sec. Lt. T. H. McArthur, K.O. Sco. Bord., and to be transfd. to Gen. List, Jan. 1st.

TERRITORIAL FORCE.—Infantry.—E. Kent R.—Sec. Lt. R. T. H. Watson is secd. for duty with R.F.C., Nov. 18th, 1916.

Glouc. R.—Sec. Lt. J. L. Bicknell is secd. for duty with the R.F.C., Nov. 29th, 1916.

S. Staffs. R.—Sec. Lt. V. M. Montague-Smith is secd. for duty with the R.F.C., Dec. 28th, 1916.

Highland L.I.—Sec. Lt. T. Barclay is secd. for duty with the R.F.C., Dec. 27th, 1916.

Arg. and Suth'd. Highrs.—Sec. Lt. C. W. Fidler is secd. for duty with the R.F.C., Dec. 28th, 1916.

* * *

From the "London Gazette" Supplement, Jan. 20th, 1917.

War Office, Jan. 20th.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed :—Sec. Lt. W. E. Young, Dorset R., Spec. Res., Jan. 1st. Temp. Lt. W. G. S. Curphey, M.C., Gen. List, Jan. 8th.

Flying Officers.—Lt. G. T. Morris, Ayrshire R.H.A., T.F.; temp. Sec. Lt. A. C. Pepper, Worc. R., and to be transfd. to Gen. List, Dec. 16th, 1916. Temp. Sec. Lt. F. A. Matthews, R. Suss. R., Dec. 17th, 1916. Capt. N. C. Riddell, R. Scots, T.F.; Sec. Lt. F. Stedman, Ind. Army Res. of Officers; Sec. Lt. F. R. Evans, Ches. R., Spec. Res., and to be secd.; Sec. Lt. R. Robertson, Hamps R., T.F., Dec. 18th, 1916. Sec. Lt. D. T. Steeves, Spec. Res., Dec. 28th, 1916. Sec. Lt. W. E. Young, Dorset R., Spec. Res., from a Flying Officer (Observer), with seny. from June 12th, 1916. Temp. Sec. Lt. S. J. Oliver, Gen. List; Lt. W. B. McDonald, 72nd Canadian Inf. Bn.; Sec. Lt. A. A. Duffus, High. Brig., R.F.A., T.F., Dec. 31st, 1916. Temp. Capt. S. W. Vickers, Ches. R., and to be transfd. to Gen. List; temp. Sec. Lt. D. P. Walter, Gen. List; temp. Sec. Lt. A. W. Erlebach, Gen. List; Lt. T. D. Campbell, Canadian Machine Gun Serv.; Sec. Lt. (on prob.) R. E. Adeney, R. W. Surr. R., Spec. Res., and to be secd., Jan. 1st.

Balloon Co. Comdrs. (graded as Sqdn. Comdrs.).—From Flight Comdrs., and to be temp. Majors whilst so employed :—Temp. Capt. R. L. Farley, Gen. List, Jan. 1st. Lt. (on prob.) (temp.

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Capt.) E. J. E. Hawkins, Ind. Army Res. of Officers, Jan. 5th. (Graded as a Flight Comdr.).—Sec. Lt. (temp. Capt.) W. Wallace, Northumbrian Brig., R.F.A., T.F., from a Balloon Officer, and to retain his temp. rank whilst so employed, Dec. 5th, 1916.

Balloon Officers.—Sec. Lt. V. M. Montague-Smith, S. Staffs R., T.F.; Sec. Lt. S. S. Stone, W. Yorks R., Spec. Res., and to be secd.; Sec. Lt. D. C. Bell, Midd'x R., T.F.; Sec. Lt. E. St. T. W. Freer, Suff. Yeo., T.F.; Sec. Lt. H. C. Fulcher, Sig. Serv., T.F.; Sec. Lt. (on prob.) C. W. Fidler, Arg. and Suth'd Highrs., T.F.; temp. Sec. Lt. S. Pickford, Gen. List, Dec. 28th, 1916.

Adjutant.—Lt. C. H. Waring, 18th Hrs., Spec. Res., Dec. 31st, 1916.

Park Comdrs.—The appointment of Capt. (temp. Major) F. Jolly, Spec. Res., is antedated Oct. 25th, 1916.

Special Appointment (graded as a Park Comdr.).—Sec. Lt. (temp. Capt.) F. C. V. Laws, Lincs R., from an Equipment Officer, 1st Cl., and to be temp. Major whilst so employed, Dec. 22nd, 1916.

Equipment Officers, 2nd Cl.—From the 3rd Cl., and to be temp. Lts. whilst so employed:—Sec. Lt. C. N. Seemann, Spec. Res.; Temp. Sec. Lt. J. K. Mountain, Gen. List; Temp. Sec. Lt. C. K. Shepherd, Gen. List; Temp. Sec. Lt. D. B. Cleghorn, Gen. List; Sec. Lt. J. Kemper, S. Lan. R., Jan. 1st. Sec. Lt. T. L. F. Burnett, Spec. Res., Jan. 7th.

Equipment Officers, 3rd Cl.—Sec. Lt. C. W. Olliver, Spec. Res., Oct. 20th, 1916. Temp. Sec. Lt. C. F. Wormull, Gen. List, Oct. 22nd, 1916. Sec. Lt. S. G. Elliott-Smith, Spec. Res., Nov. 14th, 1916. Sec. Lt. H. F. Wilkinson, Spec. Res., Nov. 16th, 1916. Temp. Sec. Lt. A. W. Armstrong, Gen. List, Dec. 7th, 1916. Qrmr. and Hon. Maj. J. Liddle, T.F. Res., Dec. 29th, 1916.

Infantry.—Cameron Highrs.—Sec. Lt. to be Lt.—G. E. Gordon Duff, July 23rd, 1916, and to be secd. from Oct. 24th, 1916, for service with R.F.C.

Memorandum.—E. T. Eastwood to be temp. Hon. Lt. (without Army pay or allowances) whilst employed as an Asst. Inspr., Aeronautical Inspn. Dept., Jan. 1st.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. F. P. Scott is secd. for duty with the R.F.C., Dec. 11th, 1916.

R.H.A.—Lt. G. T. Morris is secd. for duty with the R.F.C., Dec. 16th, 1916.

R.F.A.—Sec. Lt. A. A. Duffus is secd. for duty with the R.F.C., Dec. 31st, 1916.

R.E.—Sec. Lt. F. T. Sinclair is secd. for duty with the R.F.C., Jan. 1st.

Infantry.—R. Scots.—Capt. N. C. Riddell is secd. for duty with R.F.C., Dec. 18th, 1916.

Hampshire R.—Sec. Lt. (temp. Capt.) H. W. Kingdon is secd. for duty with the R.F.C., Dec. 10th, 1916. Sec. Lt. R. Robertson is secd. for duty with the R.F.C., Dec. 18th, 1916.

* * *

From the "London Gazette" Supplement, Jan. 22nd, 1917.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdr.—Sec. Lt. (temp. Lt.) E. M. L. Ainslie, Midd'x R., T.F., from a Flying Officer, and to be temp. Capt. while so employed, Dec. 31st, 1916.

Flying Officers.—Sec. Lt. (temp. Capt.) R. T. H. Watson, E. Kent R., T.F., Nov. 18th, 1916. Temp. Sec. Lt. C. G. F. Osborn, Bord R., and to be transfd. to Gen. List, Dec. 4th, 1916. Temp. Sec. Lt. N. A. Lawrence, attd. R. Fus.; Temp. Sec. Lt. G. E. Browne, British W. Indies R., and to be transfd. to Gen. List, Dec. 7th, 1916; Sec. Lt. (temp. Capt.) H. W. Kingdon, Hamps R., T.F., Dec. 10th, 1916. Sec. Lt. F. P. Scott, E. Rid. of Yorks Yeo., T.F., Dec. 11th, 1916. Temp. Lt. E. S. Howells, Welsh R., and to be transfd. to Gen. List, Dec. 13th, 1916. Temp. Sec. Lt. J. Angus, attd. Gord. Highrs., Dec. 14th, 1916. Temp. Sec. Lt. E. H. King, attd. R. Fus., Dec. 15th, 1916. Temp. Sec. Lt. W. A. G. Young, Gen. List; temp. Sec. Lt. L. W. Barney, Gen. List, Dec. 28th, 1916. Temp. Sec. Lt. T. C. Arnot, Gen. List, Dec. 29th, 1916. Capt. J. E. A. O'Dwyer, Notts and Derby R., and to be secd.; Lt. E. A. Fawcus, North'd Fus., T.F., Dec. 30th, 1916.

Equipment Officers, 3rd Cl.—Sec. Lt. J. Morris, from Unattd. List, T.F., and to be temp. Sec. Lt., Gen. List, Dec. 6th, 1916 (substituted for notification of Jan. 9th). Temp. Sec. Lt. (on prob.) J. L. Denman, Gen. List, Nov. 20th, 1916. Temp. Qrmr. and Hon. Lt. C. A. E. Lloyd, Gen. List, Dec. 18th, 1916. Sec. Lt. F. T. Sinclair, Welsh Divl. Engrs., R.E., T.F.; Sec. Lt. F. C. Berkeley, Spec. Res.; temp. Sec. Lt. F. Knight, Gen. List; temp. Sec. Lt. T. J. Legate, Gen. List; temp. Sec. Lt. S. McLaughlin, Gen. List, Jan. 1st.

Schools of Instruction.—Central Flying School.—Asst. Comdt. (graded as a Wing Comdr.).—Capt. (temp. Major) G. A. K. Lawrence, D.S.O., R.A., a Sqdn. Comdr., and to be temp. Lt.-Col. whilst so employed, vice Capt. (temp. Lt.-Col.) G. E. Todd, Welsh R., Jan. 1st.

Memorandum.—E. A. Wraight to be temp. Hon. Lt. (without Army pay or allowances) whilst employed as an Asst. Inspr., Aeronautical Inspection Dept., Dec. 9th, 1916.

* * *

A special supplement to the "London Gazette," dated Jan. 22nd, contains the following:—

The King has been graciously pleased to award the Military Medal for bravery in the Field to the following Non-Commissioned Officer and Man:—

820 Flt. Sgt. A. Hamilton, R.F.C.
2073 1st. Cl. Air Mech. O. F. Watts, late R.F.C.

NAVAL.

The following appts. have been made in the Royal Naval Air Service:—

Jan. 19th.—Capt.—C. L. Lambe, graded as Wing Capt., seny. Dec. 31st.

A.M.I.—J. Meadows, promoted to rank of Wt. Officer (2nd Grade), seny. Jan. 16th.

Temp. commissions as Lieut. (R.N.V.R.) have been granted to Mr. F. A. Yeo and Flt. Sub-Lt. (temp.) H. F. Mills, seny. respectively May 31st, 1915, and Jan. 17th.

Jan. 22nd.—Flt. Lt.—R. M. Everett, apptd. Act. Flt. Comdr., seny. Dec. 14th, 1916.

Flt. Sub-Lt. S. J. Wooley, apptd. Act. Flt. Lt., seny., Dec. 3rd, 1916.

The following Chief Petty Officers have been promoted to Warrant Officers (II. grade), seny. Jan. 18th:—C. Snow, C. H. Hayman, R. J. E. Haynes, T. F. Mathewson, E. E. Crook, J. V. Reeve, G. Brooks, J. W. Hoskings, H. Nelson, A. H. P. Berry, W. Wheatley, J. W. Hutchins, E. Simpson, B. Scovell, H. J. Usher, W. Gill, G. A. Stroud, H. G. Cook, A. Matthews, R. L. Hartley, W. R. Heywood, G. N. Coward, and C. Attrill.

The undermentioned have been promoted to Warrant Officers, II. grade (temp.), seny. Jan. 18th:—Chief Petty Officers (II. grade).—A. A. Barnes, H. E. Maskew, K. W. Rainbow, C. W. Pidcock, R. Gowing, H. A. Ward, J. E. Catt, B. Williams, A. B. Redstone, and J. A. Owen. Chief Petty Officer (III. grade).—L. Burgoine. Petty Officers.—J. D. Shotter, G. V. Grundy, and G. S. Wybrow. A.M. (I.).—C. Urmson.

Jan. 23rd.—Wing Commrs. (Actg. Wing Capts.).—R. M. Groves and W. Elder, both promoted to Wing Capts., seny. Dec. 31st.

Flt. Lt.—H. K. Thorold, D.S.C., reapptd. actg. Flt. Commr., seny. Dec. 29th.

Flt. Sub-Lts. (Temp.)—L. M. Bailey, E. E. Maitland-Heriot, A. G. B. Ellis, and W. H. Strettel-Miller, all reapptd. Actg. Flt. Lts. (temp.), seny. Dec. 29th.

Mr. J. W. Griggs, granted a temp. commn. as Lt. (R.N.V.R.), seny. Jan. 20th, and apptd. to "President," addl., for duty with R.N.A.S.

The Casualty List.

Reported Jan. 17th.

Killed.—Vallings, Flt. Sub-Lt. Ranulph H. K., R.N.

Died of Injuries.—Hollidge, W. T., 1st Cl. Air Mech., F.8633.

H.M.S. "Ben-my-Chree."—Wounded.—Bennison, E. A., A.B., 239370 (Ch.); Billett, W., Ldg. Smn., 182716 (Ch.); Farthing, Ll., W. Tel. Operator 1st Cl., R.N.R., 266 W.T.S.; Tolley, F. C., Air Mech., 1st Cl., F.4153. Specially entered Mercantile Rating. Greeney, C., A.B.

Reported Jan. 19th.

Missing.—Peberdy, Flt. Sub-Lt. W. H., R.N.

Slightly Injured.—Lee, Mr. H. W., Flight Officer, R.N.

PERSONAL NOTICES.

Death.

VALLINGS,—Flt. Sub-Lieut. R. K. J. Vallings, R.N., whose death is officially announced, was killed on Jan. 13th, aged 23. He was the elder surviving son of the Rev. J. F. Vallings, vicar of Sopley.

Engagement.

WATKINS—COOKE-YARBOROUGH.—An engagement is announced between Flt. Comdr. Harold E. Mostyn Watkins, R.N., son of the late Rev. Charles and Mrs. Watkins, and Dorothy, younger daughter of the late William Cooke-Yarborough and Mrs. Cooke-Yarborough, of 126, Sinclair Road, W.

MILITARY.

War Office Communiqué.

Jan. 22nd.—The General Officer Commanding the British Forces in Mesopotamia reports:—

On the 20th inst. our aeroplanes carried out a raid on the Turkish munition factory situated in the citadel at Bagdad. Six 100-lb. bombs were dropped in and around the factory.

The Casualty List.

Reported Jan. 17th.

Previously reported Missing, now reported Died of Wounds.—Saint, Lt. W. B., R. Scots, attd. R.F.C.

Previously reported Missing, now reported Prisoner in German Hands.—Raymond-Barker, Sec. Lt. A. B., R.F.C.

Wounded.—R.F.C.—Browning, 381 Cpl. P. (Wimborne).

Reported Jan. 18th.

Previously reported Missing, now reported Prisoner in German Hands.—Evans, Sec. Lt. H. F., R.H.A. and R.F.C.

(Continued on page 292.)

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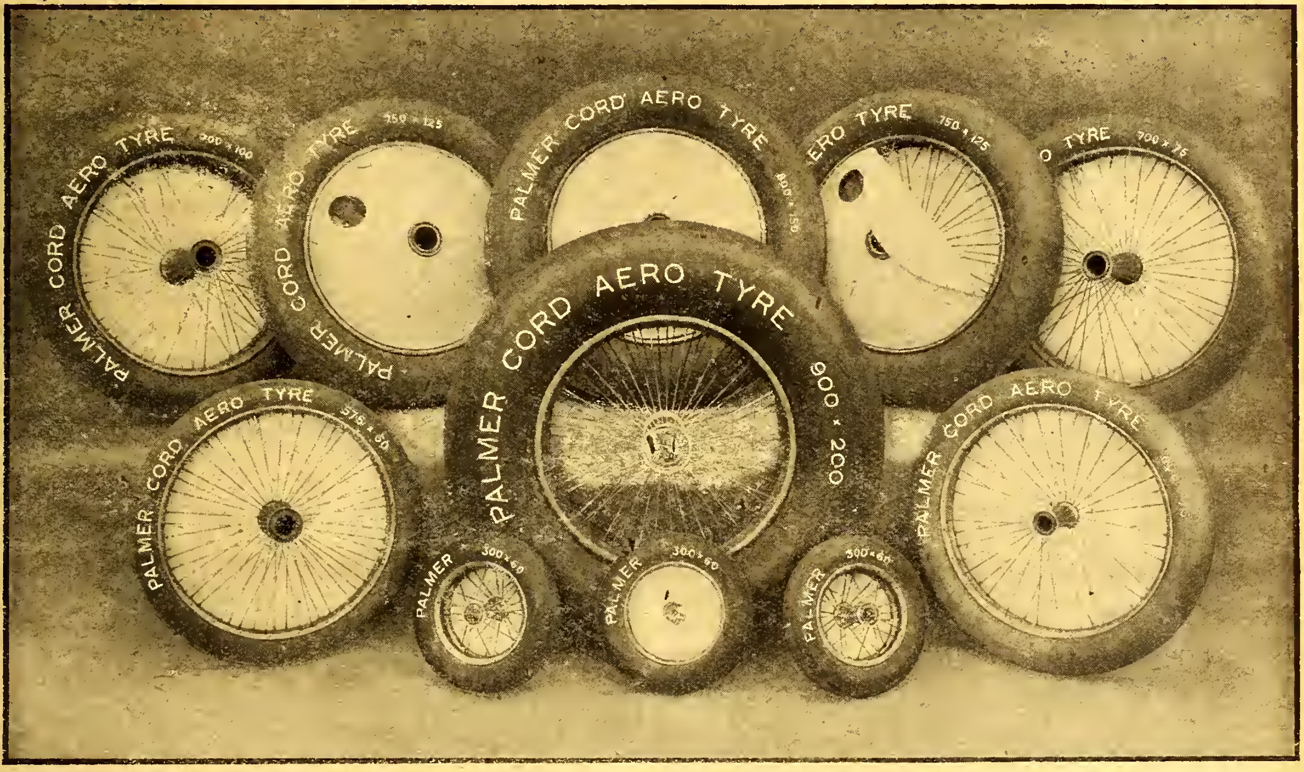
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AERO TYRE 750 × 125
PALMER CORD AERO TYRE 800 × 150
AERO TYRE 750 × 125
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PALMER CORD AERO TYRE
PALMER 300 × 60
PALMER 300 × 60
PALMER 300 × 60

STANDARD SIZES:

Tyre Sizes	Wheel No.	Hub		Track Line	Tyre Sizes	Wheel No.	Hub		Track Line	Tyre Sizes	Wheel No.	Hub		Track Line
		Length	Bore				Length	Bore				Length	Bore	
		m/m	m/m	m/m			m/m	m/m	m/m			m/m	m/m	m/m
300 × 60	16	111.12	25.4	Central	700 × 75	9	178.	44.45	132/46	750 × 125	18	178.	44.45	132/46
,,	17	72.39	12.7	Central	,,	20	178.	38.09	132/46	,,	26	150.	40.	Central
					,,	75	178.	31.75	132/46	,,	33	150.	38.09	Central
450 × 60	30	89,	31.75	Central	,,	80	178.	44.45	132/46	,,	38	178.	38.09	132/46
										,,	66	178.	38.89	132/46
575 × 60	14	150,	38.09	104/46	700 × 100	2	185.	55.	135/50	800 × 150	8	185.	55.	135/50
,,	21	160.	28.	Central	,,	4	185.	55.	Central	,,	10	185.	55.	Central
,,	34	150.	31.75	104/46	,,	18	178.	44.45	132/46	,,	36	185.	55.	135/50
					,,	26	150.	40.	Central	,,	40	185.	60.32	135/50
600 × 75	14	150.	38.09	104/46	,,	33	150.	38.09	Central	900 × 200	42	185,	60.32	125/60
,,	21	160.	28.	Central	,,	38	178.	38.09	132/46	,,	47	185.	55.	125/60
,,	34	150.	31.75	104/46	,,	66	178.	38.89	132/46					
					750 × 125	2	185.	55.	135/50	1100 × 200	52	185.	55.	116/69
					,,	4	185.	55.	Central	,,	57	185.	55.	Central

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ON THE WHY AND WHEREFORE OF IT.

This week there is introduced to readers of THE AEROPLANE a new feature—namely, the AERONAUTICAL ENGINEERING Supplement—in which will be incorporated everything to do with the constructional side of aircraft, such as Aeroplane, Airship, and Aircraft Engineering generally, Aerodynamics, Aerodonetics, and Aerotechnics of all sorts, as occasion occurs to deal with them; and, in fact, everything to do with the making and testing of aircraft, and of interest to the Aircraft Engineer or Aircraft Trader, as distinct from Service flying, sporting flying, and aeronautical politics—of which last we have had a great deal too much in the past, and will, one fears, have very much more in the future.

The object in thus separating the two sections of the paper is to enable the Service man who is not interested in how his machines are built or why they fly—or do not—to read about Service and political matters, and about sporting matters when "the Peace-cloud breaks" and flying becomes a sport, without being bothered by paragraphs or articles concerning trade affairs or technical matters.

Also, the alteration is made to enable those in the Aircraft Industry who are not personally interested in Service affairs to read the latest available technical or trade information without being faced by pages of gazettes and so forth while looking for it.

Even to those who are interested in both subjects, the alteration should be an advantage, because it will allow them to "departmentalise" their reading, so to speak, and to read AERONAUTICAL ENGINEERING with the engineering compartment only of their brains.

It is quite surprising to find how many letters one receives, as Editor of this paper, from readers desiring that more attention should be given to this, that, or the other subject, and less space devoted to some other subject in which the writers are not personally interested. Apparently it is not that the writers of such letters want more reading matter in the aggregate, but merely that they want less of the kind that does not amuse them. Frequently they ask for information which has already been given, only that perhaps it has been stowed away among paragraphs on other subjects, so that they have missed it. The present innovation is largely influenced by a desire that readers who want to read about certain subjects and not about others may be assisted in finding what they want.

There is also a certain amount of foresight in this move. The time may come when the Aircraft Industry, like all other great industries, will need a purely technical paper of its own, and it is intended that when that time comes AERONAUTICAL ENGINEERING shall already exist, as a branch of THE AEROPLANE, which can be separated off to grow into an equally strong tree, equally devoted to the progress of British Aeronautics and to the foundation of that progress, the welfare of the Aircraft Industry.

That time cannot come till after Peace is declared, for to be of highly educative value AERONAUTICAL ENGINEERING would have to publish information which would be, perhaps, of greater value to the enemy than to the British aeronautical engineer, but in the meantime it seems possible to publish quite a good deal of technical matter and trade news, which will be of value and interest, without conveying information to the enemy.

So many thousands of new men have come into the Aircraft Industry during the past year or two, who have had a general engineering training, but know little or nothing about aeronautical engineering, that, though some of the information may seem a trifle like ancient history to the older hands, it may be quite valuable to new-comers. Nevertheless, every effort will be made to make AERONAUTICAL ENGINEERING interesting even to the pioneers of British Aeronautics.

Whenever there is a trade boom in any industry, there always arises a crop of newspapers ostensibly devoted to the welfare of that industry. One remembers the time when there were something like a dozen papers battening on the Cycle Trade. To-day there appear to be two papers only, one a trade paper, both of which fought the trade's battles in the days of its weakness, and have deservedly survived.

Similarly in the Motor Trade, we have the "Motor Trader," going strong as the purely trade organ, and "The Autocar" and "The Motor" for the public, each in its way a pioneer paper which fought strenuously for the rights of motorists; and there is one paper devoted to automobile engineering; yet there was a regular cloud of motor papers at one time.

Motor-cycles and light cars each have their two rival papers, which is healthy and as it should be.

One sees already signs of a multiplicity of papers arising, all hoping to make a living out of the present prosperity of the Aircraft Industry. Some may be good, some may be bad, but none of them have, so to speak, "borne the burden in the heat of the day"—or perhaps one should more correctly say "during the official freeze-out"—as have the papers which managed to exist during the lean years of the pre-war period.

Gratitude has been defined as "a lively sense of favours to come." Nevertheless, one does not hesitate to express on behalf of all aviation papers a feeling of gratitude to the Aircraft Industry for the support which it has given the more or less technical Press in the past, and one believes that the Aircraft Industry in turn is not altogether ungrateful for what the Press has done for it. One hopes, therefore, that the older members of the Aeronautical Press and the Aircraft Industry may continue to support one another for their mutual good in the future.

Every effort will be used to make AERONAUTICAL ENGINEERING of real use to the Aircraft Industry, whether as a supplement to THE AEROPLANE or, as one hopes it may be in time to come, a purely technical paper of the highest class. With which introduction one commends this supplement to all those concerned with the construction of aircraft.—C. G. G.

Possible Improvements in Carrying Capacity and Speed of Rigid Airships

BY C. DORNIER, Count von Zeppelin's Engineer

Abstract by W. P. Beehler (Published in "Aviation," New York, Dec. 15, 1916).*

FUNDAMENTAL EQUATIONS OF THE DIRIGIBLE.

Let V equal the available gas volume of the airship in cubic metres, s the difference in specific weights between gas and air per cubic metre, then the following expression is obtained for the buoyancy of the ship, H:

$$H = V s \text{ in kilogrammes.}$$

The net weight Le (empty weight) of the ship comprises the following weights: Weight of the frame, outer hull, steering apparatus, gas cells, balancing planes, pontoons, structures, etc. The weight G_m of the machinery installation necessary for the propulsion of the ship comprises the weight of the motors and accessories, the tanks and pipes, the shafting and air propellers. If k_m is the weight of the machinery installation per horse-power in kilogrammes, then we obtain the following expression for the weight of the installation necessary to yield Ne horse-power:

$$G_m = k_m Ne \text{ in kilogrammes.} \qquad (1)$$

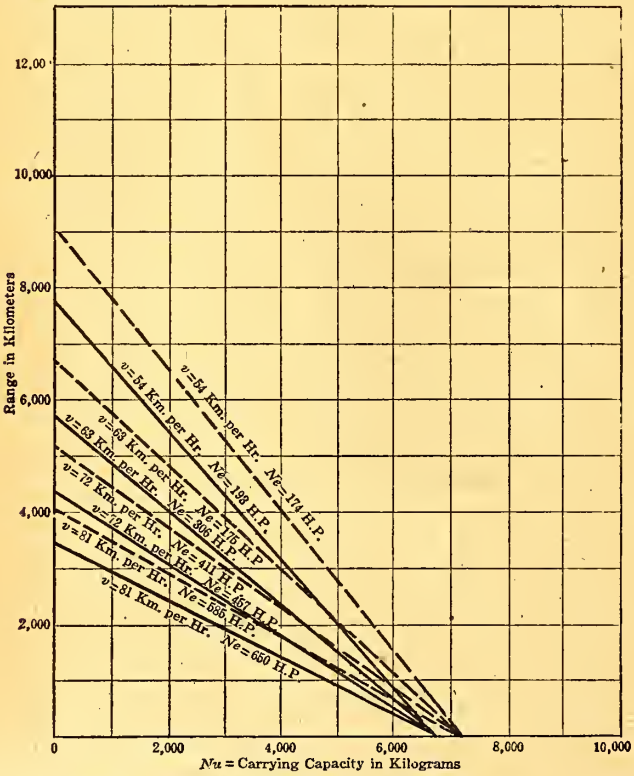
The amount of fuel oil necessary to drive the motor, per horse-power hour (k_b) may be taken as constant, and we obtain the following expression for the weight of fuel necessary to a flight of t hours:

$$B = k_b \; Ne \; t \text{ in kilogrammes.} \qquad (2)$$

If we subtract from the lifting force the net weight of the ship, the weight of the machinery installation, and the weight of the necessary fuel for the required time of flight, the remainder will equal the available carrying capacity which can be utilised for passengers, crew, munitions, etc. The relation for the available carrying capacity:

$$Nu = H - Le - Ne\,(k_m + k_b \; t) \qquad (3)$$

is then obtained.



Full lines show present relations, $C = 3.0$.
Dotted lines show relations when a C is 10 per cent smaller. $C = 2.7$.
Weight of crew = 1000 kilograms, deducted.

Fig. 1.—Influence of the Reduction of the Ship-Resistance Coefficient on a Ship of the "Sachsen" Type.

If the resistance of the ship at v metres per second is equal to W kilogrammes, then the relation giving the necessary power for the development of such speed is

$$Ne = \frac{W v}{n_o \times 75} \text{ in horse-power}$$

where the over-all efficiency of the machinery installation is n_o.

The resistance offered by a ship in maintaining a speed of v metres per second is given by the equation

$$W = C v^2 \qquad (4)$$

where C is a coefficient independent of the speed.

We obtain therefore:

$$Ne = \frac{C v^3}{n_o \times 75} \qquad (5)$$

By putting this value of Ne in the equation (3) we obtain for the available capacity:

$$Nu = H - Le - \frac{C v^3 (k_m + k_b \cdot t)}{n_o \times 75}$$

On account of the far-reaching value of this equation, this may be termed the fundamental equation for dirigibles.

POSSIBILITY OF INCREASING CARRYING CAPACITY, WITH CONSTANT VOLUME BY IMPROVING RESISTANCE COEFFICIENTS.

Next must be considered the possibility of an increase in the carrying capacity of rigid airships on the assumption that an increase in the volumetric contents, or gas space, is not possible. The lifting force can only be increased, with a constant volume, by making use of a lighter gas. In the most favourable case (using a vacuum), an increase of about 7 per cent. could be obtained. Practically, an increase in the carrying capacity cannot

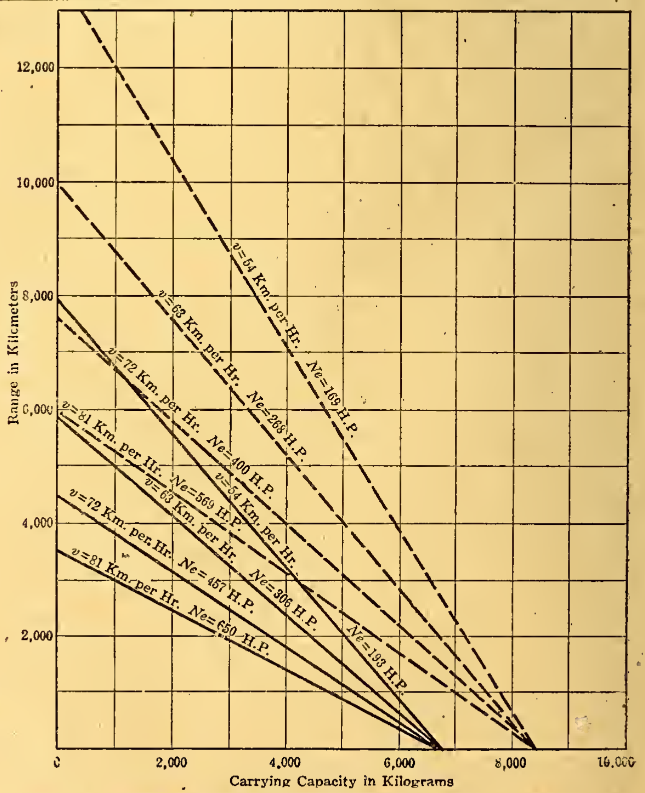


Fig. 2.—Influence of an Improvement of k_m k and n on Ships of the "Sachsen" Type.

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* From an article in the Annual of the Society of Naval Architects (Berlin).

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be obtained in this direction. The net weight of the ship cannot be appreciably decreased. There remains only the possibility of increasing the carrying capacity of the ship without an increase in volume, by a reduction in value of the resistance coefficient. This can be brought about by a better form for the dirigible.

Fig. 1 shows what may be obtained by a reduction of about 10 per cent. of the coefficient of resistance, on a ship having about the same over-all dimensions as the "Sachsen." The available carrying capacities are taken as abscissae, and the length of voyage in kilometres is the corresponding ordinate. The broken line indicates the relations obtaining when the coefficient of resistance is reduced from 3 to 2.7. From the diagram we obtain the following improved capacities for a voyage of 4,000 kilometres :

- At 54 kilometres per hour, 4,100 kilogrammes, against 3,400 kilogrammes with the "Sachsen" class ;
- At 63 kilometres per hour, 3,000 kilogrammes, against 2,200 kilogrammes with the "Sachsen" class ;
- At 72 kilometres per hour, 1,700 kilogrammes, against 770 kilogrammes, with the "Sachsen" class ;
- At 81 kilometres per hour, 200 kilogrammes, against 0 kilogrammes with the "Sachsen" class.

The above diagram also shows a considerable reduction in the power requirements.

Possibility of Increased Range, with Constant Volume by Improvements in Power Installation.

The over-all efficiency of the air propeller installation, which at present lies between 0.65 and 0.70 on account of the influence of the propellers on each other, may still be slightly improved. Fig. 2 shows, however, for the ship used as a basis for Fig. 1, also, the improvement in range when n_n equals 0.8 instead of 0.7 ; km equals 4 instead of 6 kilogrammes per horse-power, and kb equals 0.2 in place of 0.24 kilogrammes per horse-power hour. The increase in range obtained thereby, as shown by the diagram, is extraordinary. We take the value from the 3,000 kilogramme carrying capacity ordinate :

- At 54 kilometres per hour, 8,750 kilometres, against 4,500 kilometres with the "Sachsen" class ;
- At 63 kilometres per hour, 6,450 kilometres, against 3,300 kilometres with the "Sachsen" class ;
- At 72 kilometres per hour, 4,850 kilometres, against 2,500 kilometres, with the "Sachsen" class ;
- At 81 kilometres per hour, 3,800 kilometres, against 2,000 kilometres with the "Sachsen" class.

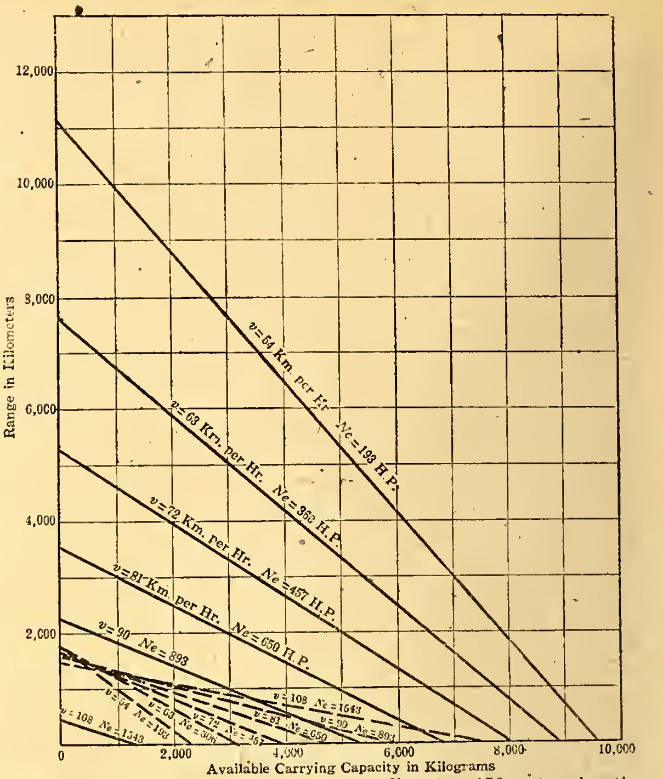
These figures speak for themselves, and may soon be attained.

Improvement in Carrying Capacity and Range with Increase in Size.

The considerations will be limited to a fleet of similar ships having the ratio of diameter to length equal to 0.1, in accordance with current practice. The outer form of the ship will also be similar to the construction in vogue at present.

From experience obtained with ships of from 11 to 16.6 metres in diameter, as well as the exact weight measurements obtained on ships of from 22 to 25 metres diameter, certain fundamental relations can be established which can be used for the entire range of ships of diameters from 8 to 30 metres, and a corresponding length of 80 to 300 metres. The length of the ship will always be taken as 10 times the diameter, so that when the diameter is given the other over-all dimensions of the ship are definitely established.

Numerical examples taken from the curves of Fig. 3 will show clearly the influence of an increase in the over-all dimensions on the power of the ship :



Full lines represent airship, 15 meters diameter, 150 meters length ; $n = .7$; $k_m = 6$; $k = 24$; C 3.0.

Dotted lines represent airplane ; $n = .7$; $k^m = 2.5$; $kb = 3 \times 1.2$; $k = 0.13$.

With airships 1,000 kilograms is deducted for weight of crew

Fig. 4.—Comparison between Airships and Aeroplanes.

1. *Given,* the length of voyage of time of flight and the speed ; *desired,* the available capacities obtainable for a given ship. As numerical examples take a distance of 7,200 kilometres ; mean speed, 72 kilometres per hour ; the time of flight is, therefore, 100 hours, and the speed is, therefore, 20 metres per second. We then look for the intersection of the line v equals 20 and t equals 100, of the various sized ships. We read for example :

D equals	18	20	22	25	30 metres.
Nu equals	600	3400	7300	25200	33300 kilogrammes.

The increase in the diameter from 18 to 30 metres, therefore, raises the available carrying capacity 55 times.

2. *Given* the available capacity and speed ; *desired* the time of flight and the distance travelled for ships of various sizes. As a numerical example : Capacity 15,000 kilogrammes, speed 25 metres per second equals 90 kilometres per hour.

We find the point of intersection of the various ship lines with the ordinate at the point where the capacity is 15,000 kilogrammes. The diagram shows us that 15,000 kilogrammes capacity can only be obtained by ships having a greater diameter than 16 metres. We obtain the following, for example, from the diagram for a speed of 25 metres per second.

D equals	20	22	25	30	metres.
t equals	10	23	39.5	57.5	hours.
s equals	900	2070	3660	5180	kilometres.

But lifting capacity and the distance travelled are not the

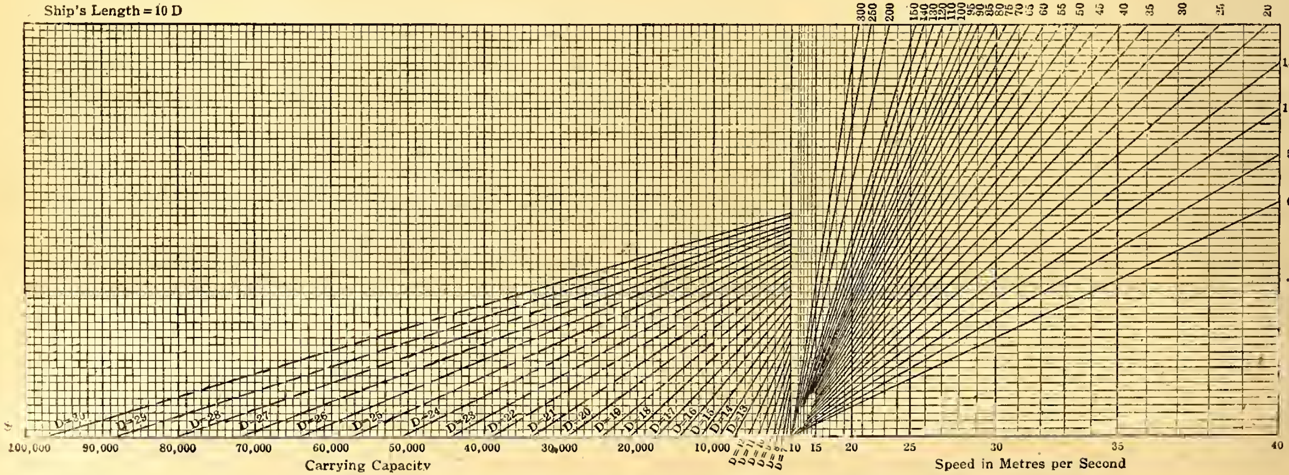


Fig. 3.—Influence of Ship Dimensions on Speed, Carrying Capacity, and Time of Flight.

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only factors increased with increased volume. The diagram in Fig. 3 shows plainly that for equal capacity **and time of flight** the larger ship will travel faster than the smaller.

Improvement with Combination of Increased Volume and Improved Installation Factors.

A further improvement is possible, when, in addition to an increase in volume ,an improvement is made in the factors H, Le, n_0, C, $k_m{}'$ and k_b. Every point between the inclined lines on the right hand side of the diagram, Fig. 3, and the y-axis determines a definite distance travelled, since the distance travelled equals the speed multiplied by the time of flight. If we draw a parallel to the x-axis from any desired point on the right hand side of the diagram to intersect a definite ship line, inclined lines on the left hand side of the diagram, then the abscissa corresponding to this point of intersection will give the corresponding capacity provided the constants are assumed as follows :

$$K_m = 6,\ k_b = .24 \text{ and } n_0 = 1.$$

The intersection of these various ship lines with the x-axis corresponds to the values of H—Le. If H or Le is improved (if H is increased or Le decreased) then these points of intersection will fall farther to the left, which means that one would obtain a greater carrying capacity for a definite size of ship. The inclination of these ship lines to the x-axis is determined by the value of the coefficient of resistance, C, and the value of n_0 assumed equal to 0.7. If these values are improved then the lines for the ships of various diameters would cut the x-axis at a greater angle, or would tend to be more nearly vertical, and, as is easily seen, this would mean an appreciable increase in speed and therefore in the distance travelled for a ship having the same carrying capacity.

An improvement in the values of k_m and k_b has the result, that the lines on the right hand side of the diagram corresponding to definite machinery weights and fuel consumption would approach closer to the x-axis, or in other words, would be swung through an angle to the right, so that with equal speeds and time of flight, there would be an increase in the carrying capacity.

The amount of the influence on these factors is determined, since with an increase in the over-all efficiency of n_0 from 0.70 to 0.75, at a speed of 30 metres per second and for a 25-hour flight, the capacities for ships of 25, 26, and 27 metres diameter will be increased as follows :

D equals	25	26	27 metres.
Nu at n_0 equal to 0.7	1200	2200	4000 kilogs.
Nu at n_0 equal to 0.75	4900	6300	8600 kilogs.

In practice, increase in volume, perfection of the machinery installation, and reduction of the resistance coefficient, go hand in hand, the only drawback being that with increase in size, the cost of construction and maintenance increases very rapidly. As a result of the above considerations, it can be safely said the airship is not at the end but at the beginning of its development.

Comparison between Airships and Aeroplanes.

In order to make a direct comparison between motor airships and aeroplanes, the diagram in Fig. 4 is given. The aeroplane curves have been derived from data obtained from the German Aeronautical Experiment Station at Aldershof. This shows the capacity of a ship of the "Sachsen" type fitted out with machinery installations of various powers, and at different speeds, compared with aeroplanes working with the same-powered engines and at the same speed.

From the diagram it is seen that, so long as it is simply a question of long voyages at a medium speed, the motor airship has the advantage over aeroplanes. If, on the other hand, it is a question of short distances at very high speed, then the aeroplane is much superior to the motor airship.

The lines for airships and aeroplanes cross at as high a speed as 90 kilometres per hour. At 108 kilometres per hour the motor airship cannot keep pace with the corresponding aeroplane of equal power. The values given in the diagram are of course not absolute, but are useful for purposes of comparison.

Some conclusions of Count von Zeppelin on Dornier's paper also show that the aeroplane is more dependent than the airship on the condition of the machinery installation. For relatively short trips up to about 1,000 kilometres, when it is a question of making the journey in the shortest possible time, they are admitted to surpass the airships on account of their much greater speed, but if it is a question of a continuous flight of over 3,000 kilometres where no landing base may be erected, such as across the Atlantic Ocean, the airship is indubitably superior.

Count von Zeppelin also suggests that the discovery of a non-combustible gas for filling the cells, even though less light, is not impossible, and that a point has already come where the gradual increase in the size of airships may enable them to be operated when filled with a heavier non-combustible gas.

Aero-motors: In Kind and Construction.—*(Continued)*

BY GEOFFREY de HOLDEN-STONE.

1916 IN REVIEW.

Call it a stupendous growth rather than a development, ever since August of 1914 caught this great deluded country with less than a hundred scratch effectives of aeroplanes, and most of the spare motors in the hands of the Royal Aircraft Factory, and you will be nearer the mark. For ever since then production at any cost, inco-ordinated, chaotic, helmless, so long as numbers resulted ; importation by wholesale of the tolerably good, the indifferent and the utterly bad to make up still more numbers ; catch-as-catch-could in the scramble and chance our necks, have together so comprised the national aero-motor business that anything like ordered, selective development has been impossible.

Naturally, it took an administration steeped over its long ears in the principle of buying all you can abroad and making as little as you can help, at least twelve months to grasp the national need of aero-motors by the gross, and even longer to sense the ability of the British engineering industry—quite another entity than that collection of factors and car merchants known as the motor trade—to make all the aero-motors we needed or were ever likely to need.

Twelve months and more of shouting need! While every heeler and automobile tout in New York City took ship to London to catch contracts and cable his "manufacturing" friends in the States for commissions and reserved profits. Thanks to Providence and Pierpont Morgan's (our filter) ninety per cent. of them missed, and are since dead, gaoled, self-deported, or borrowing shillings in the Square Mile ; having split all their commissions for introductions to one another. The other ten per cent. "clicked." Then came the period of official commissions of "inspection" of all sorts. Very difficult, and very expensive. Most difficult of all is it to divine how even a khaki suit and the ability to drive a car, or a recent motor salesmanship and—sometimes—a pilot's ticket, should qualify their owner to gauge the quality of that sublimated mechanism which is an aero-motor.

Yet so it was expected to be. And unfortunately was. When of Colonels from Chatham, *pukka* R.Es., not one in a hundred would have been equal to a job so wholly outside his probable experience.

Howbeit at the outset three telegrams to the motor-trade societies, two more to Queen Anne's Gate ; and thereafter—by the identifying touch thus given to the entire engineering trade of the land—a telegraphed request—a command under the Defence of the Realm Act—to each member thereof to state what motors he made, or, if none, what his works' capacity was for such manufacture, would at once have brought Whitehall *en rapport* with our true industrial strength.

Now it is not to be supposed that a sanitary engineer and his staff can set about making motors from a given design—though I have seen such people making propellers passing well—or any one of a dozen other branches of the all-comprehensive industry. But to any constructing firm accustomed to fine work, and having the plant and staff for it—and this again includes a score more different specialists, each with his relating knowledge—there is really no magic about the manufacture of even aero-motors to a given design. There would necessarily have been swift siftings and winnowings ; but—the whole grain of the industry would have been available, instead of losing four-fifths of it utterly. From that four-fifths of clear gain, evidence of individual capacity and use, of havings motorable, and requirements, could have been exacted. So that the grain could have been thrice refined and certified for its assured yield before a single order was passed.

Thus the whole mustering and organisation of our aero-motor production possibilities—outnumbering the few American specialists or quasi-specialists by five to one—could have been effected in less time than it actually took the latter to get ready to rush through quantities of unfamiliar crudities as best they could ; much more to manufacture, to get the product inspected, passed, and shipped to Europe.

With the home-strong aero-motor production that might thus have begun its weekly output by February of 1915, there would have been no loss of months upon months by the flower of the industry, offering work, service and production in vain, while their workmen were steadily wasted into an Army that could not use them—that still has a million of them idle who have never had a chance to cross the Channel—so that presently they had to be drafted back to shell-making wholesale. No need, consequently, to delay urgent aeroplane supplies for lack of the motors. No need to pay enormous prices for motor productions so bad that they had to be rebuilt. No need nor excuse for any R.A.F. experiment, which would have been merely an amusing

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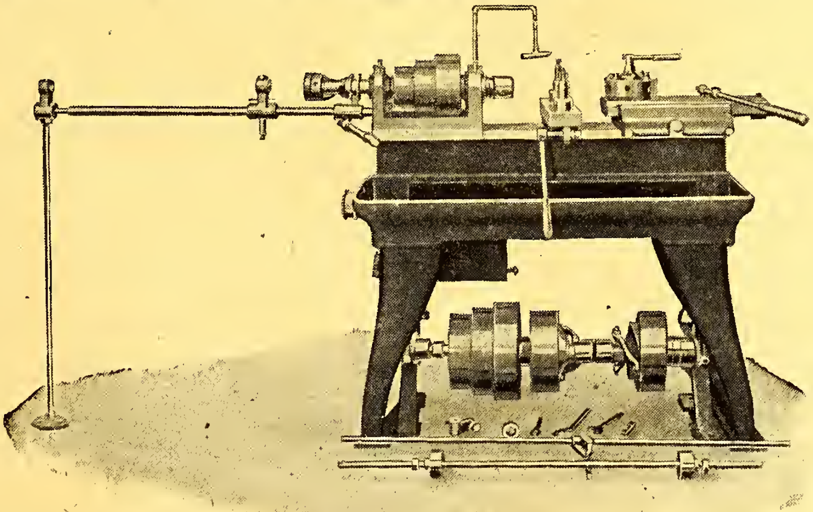

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incident, not mischievous unto disaster. No need to waste tonnage or palter with the ship-owning trade. No need of Two-and-a-half per cent. overriding commission to Anybody. And lastly, no need, in final desperation, to fall back upon the motor trade for belated supplies. Incidentally, no need to blame gallant hard-working gentlemen, doing their best along strange lines, more than half misled. Silent in their own defence, yet building better than we yet know.

What millions, what mountains of waste of effort and time would have been sowed. That assuredly. Whether a Dardanelles hazard won outright, or a war shortened by half; who knows? But all the rest of it as aforesaid, if we had an Air Ministry and an Air Board thirty months ago, as—thank goodness—we have them to-day. Instead of, let us say, an Aircraft Factory and the supply officials of two Services at feud instead of common agreement.

All this, not as a lamentation. Nor as a recommendation of policy to anybody who needs it not, and may have a better. Nor even as an excuse. But merely as a very necessary account, to explain why there has not been, nor in the circumstances, had a chance to be, any more than so little development in aero-motors, even during the past active twelvemonth.

What Saved the Flying Services.

For many reasons the rotary and its kin, the radial, as a type group, appear the most interesting, and worth the front place in the year's review. As a type, neither to my mind represent all the possibilities. If they did, there would be no others, clearly.

On the contrary, the undeniable demand for much higher power than the mechanical limitations of their type design allow them to afford, has gone so far beyond them, that they are in that sense outclassed. For power alone, not quality, be it understood.

They are each as good as ever they were; some of them are even better. They have their admitted inherent defects; but despite these, they will not be so far outclassed that their function, scope, and use will be usurped within their own power degree, until some special type comes along that is hardly in sight yet, much less in competitive production.

Meanwhile there is this to be said, that they not only saw aeroplane development through a critical period long before the war as no other type could have done just then, but that whether shortlived or not, they—and the Renault in its original and unexpurgated editions—have seen through practically the whole aero-motor service of the war. Their performance on the whole might not satisfy a critical engineer on the score of efficiencies. But it did serve the needs of military pilots and observers brilliantly, which was the infinitely more important thing.

They did this withal, when the bulk of the Transatlantic importations failed hopelessly to stand up to their work; having been at least faithfully and finely built of the best materials perhaps, in the world. Theirs, at any rate, was no faked M.E.P., but all that their design ever stood for, and a spirtle beyond at need. Their only failure—or, rather, indifferent showing—was when they were installed, as independent and wholly unsynchronised power-units, to port and starboard of certain giant freak biplanes; designed themselves as a makeshift for a special purpose. Nevertheless, without their aid—no sufficiently powerful single unit being then available—these machines would probably not have been able to fly at all, much less achieve that purpose.

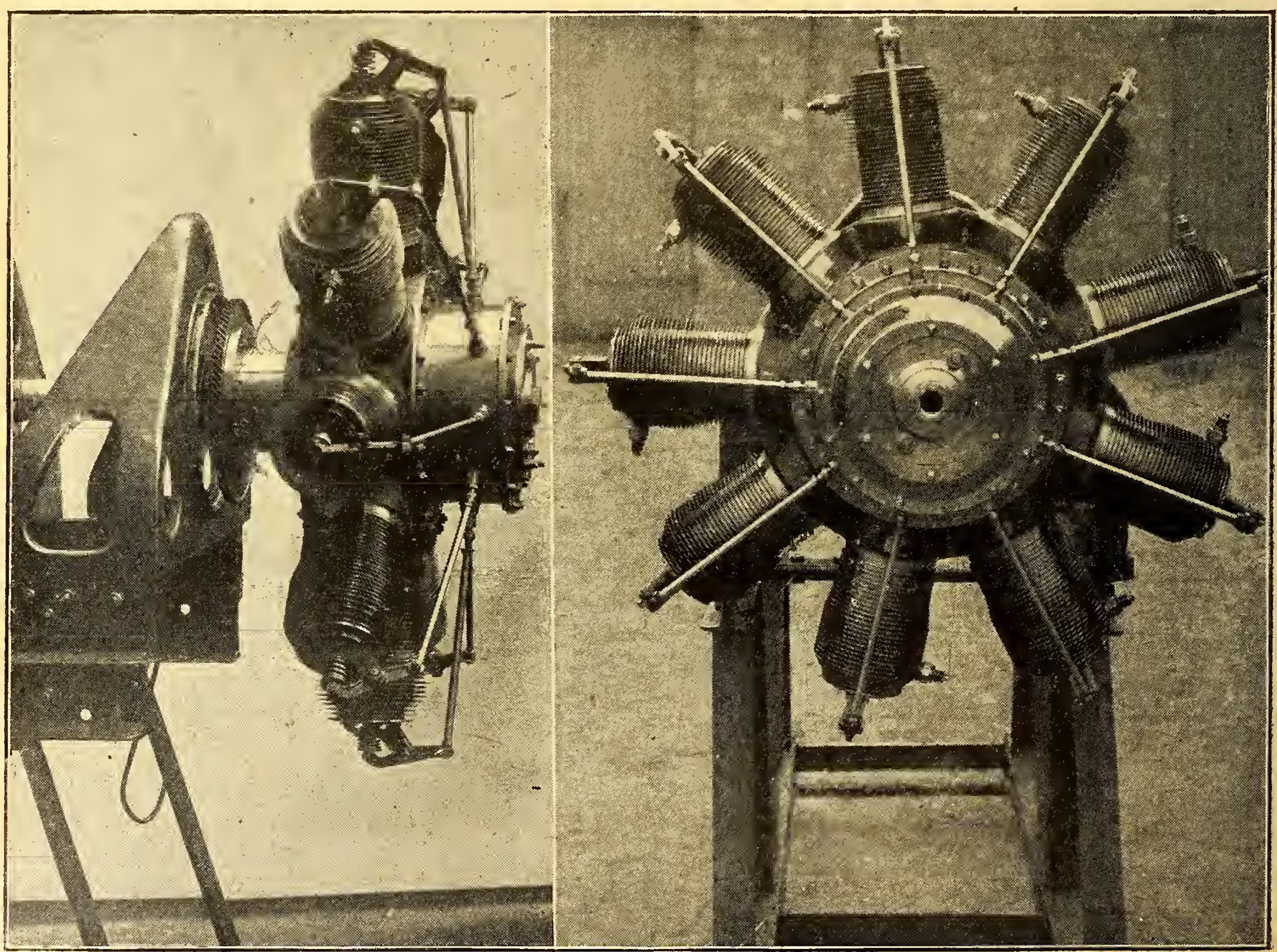
The Rotaries and Radials.

Before the war, the best-known makes of this composite group were the Gnôme in its two types, le Rhône, latterly the Clerfiêt, and—in England to some little extent—the Isaacson among the rotaries; and the Anzani and Salmson (Canton-Unné) among the radials. There were others, such as the Verdet, S.H.K., Dhenain, Esselbé, the Italian L.U.C.T., and several very promising two-stroke rotary propositions. But these were, at best, shop-tested rather than flight-proven. They had no commercial output to speak of; and it was no time to risk the series-faults that only a well-established and extensive production can discover and eliminate. So none of them appears to have survived the autumn of 1914.

For possessing, as rotaries, any and every inherent defect or limitation that might be due to their type, they merely represented mechanical improvements—such as the substitution of piston valves or cuff-type valves for poppets—which, though promising well for strength and durability, contra-indicated physical difficulties in such essentials as lubrication. Others merely displayed variations of distribution mechanism of doubtful value. So there was no reason for their further adoption then. The first-named half-dozen have done so well ever since that there has been still less reason to substitute others of the same generic type that can hardly do better. And now that the power-demand has outrun that type, there is no visible reason to revive or further develop them.

The Gnome Engine.

There can be few people interested in aviation—and certainly no readers of The Aeroplane—who are not familiar with every



Side and Front View of the Monosoupape Gnome Engine.

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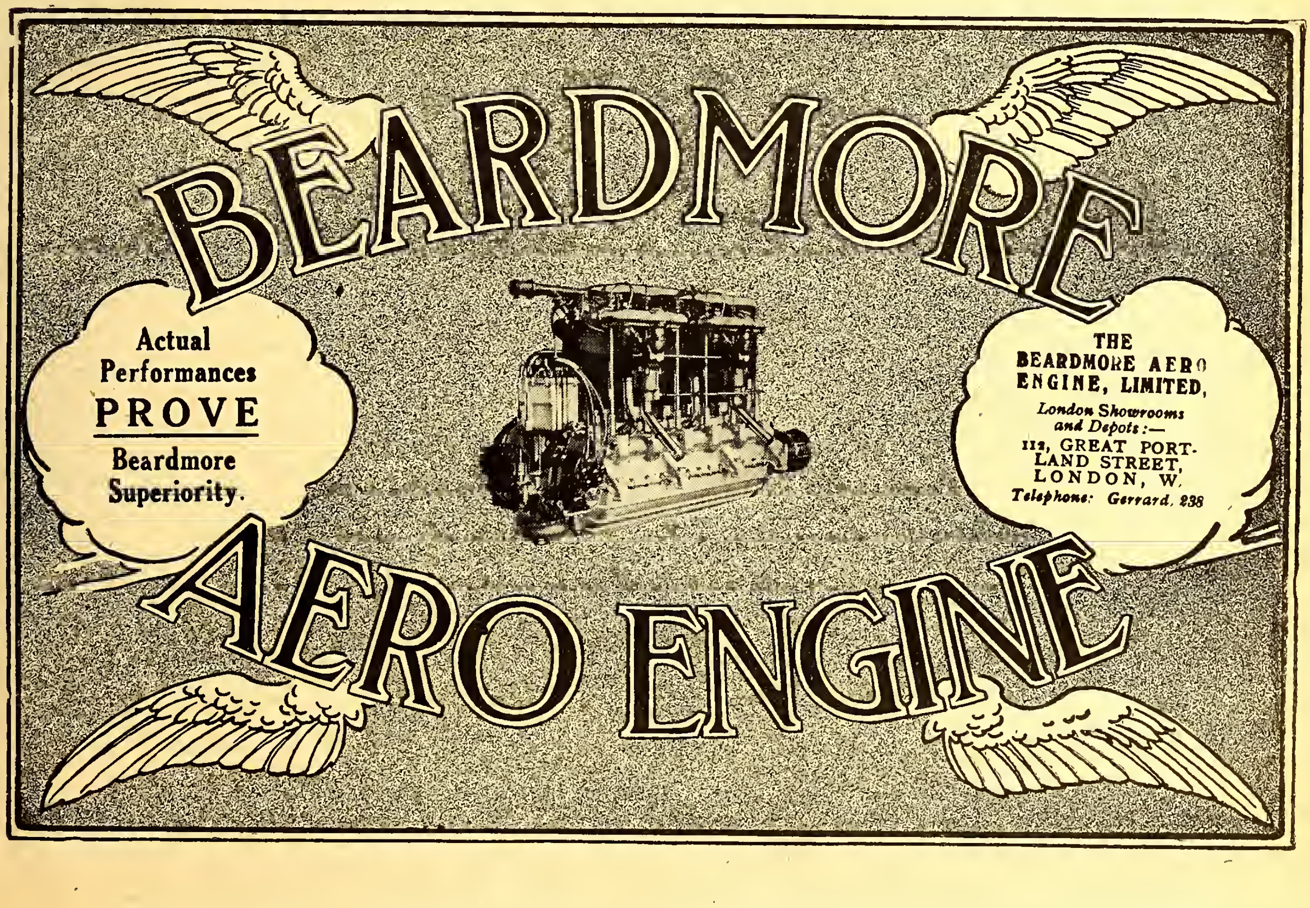

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mechanical feature of the original Gnôme design, with its piston-contained automatic inlet valves, and particularly its obturator or pressure-band encircling the piston-heads. They will also recollect its distribution for the exhaust valves, actuated much in the fashion of the back-gearing of a lathe. Also its special master-grip and drum-like connecting rod attachment to the stationary crank. They will, remember, too, how in consequence, in the Gnôme or any other rotary, it is the cylinders and not the pistons that really reciprocate; as the centre of which they are radii is, of course, some two inches eccentric to the crank-pin centre of which the pistons are radii. So there is no need for further description of the Gnôme mechanics or working principle; save to indicate the advantage of this non-reciprocation of the pistons is that there being no fling to these and their rods, there are no stresses beyond the combustion shocks on them or their attachments.

Suffice it then to say that—if only for the reasons already given—there has been no change in any of the series-models. So far as can be ascertained, none has even been enlarged; while any further multiplication of cylinder groups—as anyone who has studied the matter would agree—would be impracticable. The only variation, in fact, that I have been able to observe was the substitution of a gun-type Y spring for the coils controlling the counter-balances of the inlet valves.

The monosoupape model, on the other hand, was only just out of the experimental stage in 1914. It had run in most promising fashion, but was not perfected according to its type. Apart from its special design as a four-stroke motor with a two-stroke scheme of induction—by way of a circular transfer belt surrounding a slot-series at the bottom of the cylinder uncovered by the piston—its chief feature was the mechanical advance and retard of the exhaust valve opening.

Now the principle of the motor being, on the one hand, to inspire into the crank-chamber a mixture so enriched as to be incombustible, and on the other, to hold the exhaust valve open so long that, after scavenge, it should act as a snifter-valve, admitting air for the due impoverishment of the rich mixture as it passed in above the piston, and only closing as compression began—it followed that although some further degree of flexibility might be obtained, regular carburation was likely to be dangerously upset except under the most skilful management of the control, nor was the risk much lessened even then. Far better, then, to leave the air supply in constant volume and merely vary—by obviously simpler means—the strength of the original charge.

This was accordingly decided, and the valve-control gear got rid of quite early in 1915. Subsequent improvement—if any in a motor shorn of its chief physical trouble—has been merely in the way of minute dimensional variations or refinements of material; all that does not show, but only proves out the equation of superior quality in actual use.

The Le Rhone and Clerget.

The same remarks apply to the Rhône rotary. For quite a year before the war this motor had become such a favourite among pilots, was so ingeniously designed—especially for easier dismantling and assembly—and so trustworthy aloft, that it seemed likely to displace even the Gnôme. Under the stress of war service it still continued to display these qualities. But the cam-plates, of which the long easy contours both promised and gave such excellent results—as far as a rotary may—of a physical kind, did not in certain series stand up to the strain as expected. Their weight—they being merely flat rings bolted to quite thin webs—was certainly not excessive. Still undue wear both on their surfaces and on their actuating eccentric-throw gearing, became evident for a time. Both had to be made extra pilot-proof: a matter obviously of choice of material rather than any impracticable attempt to vary a clever and satisfactory design. This was evidently done: for I have no information of any further trouble of the kind. Suffice it that to-day the 110-h.p. le Rhône is reputed to be unsurpassed among the rotaries.

So far, too, the Clergêt—which is mechanically the reverse of the Rhône, as to gearing motion, and even so delivers its eccentric throw, so to say, in two stages—appears to have done very well. Its special valve-gear mechanism looks theoretically far less promising than the Rhône did; and to be no less weighty. In practice, nevertheless—probably because the cam-throw motion is more gradually completed, and the relative speed of the parts concerned is slighter and slower—this valve gear does appear by all accounts to stand up to very hard service. Thus the Clergêt has at least retained its favour, both officially and among those pilots who like rotaries, or are compelled to use them. No change whatever has been made in the design since 1914, size and power being its only development. The latest and largest model is understood to give something very well over 110 h.p. from its nine cylinders. And—as anyone living within a mile or two of its British manufacturing homes can testify—it has a fuller, deeper, more power-fraught note than any other of its type.

(To be continued.)

ON THE SPEAKING AEROPLANE.

Probably the phrase, "The Aeroplane Speaks," is about the quaintest title ever chosen for a technical work. A less original mind than that of the author might have arrived at calling it "The Aeroplane Flies," and the usual banal maker of books would probably have chosen "How the Aeroplane Flies."

When one remarks that any piece of mechanism is "talking a bit," one generally implies that something wants oiling or adjusting to stop the said talking, though when one says that an engine is "fairly roaring" one means that it is doing itself and its owner really well. Hence the colloquial use of epithets connoting vocal efforts by inanimate mechanisms is apt to be confusing to the uninitiated. Nevertheless, Captain Barber's title is well chosen. In the first place, one is never likely to forget it, and in the second place it describes precisely the method by which, in the clever prologue to the book, the author conveys to the seeker after aviatic truth the manners and customs of the aeroplane.

The book is dedicated to The Subaltern Flying Officer by the author, Captain H. Barber, R.F.C., who is incidentally an Associate Fellow of the Aeronautical Society, and an aeronautical engineer, experimenter, and pioneer of considerable eminence, and it is published by McBride, Nast & Co., Ltd., of Rolls House, Breams Buildings, E.C., at the price of six shillings, post free, which to anyone concerned with the paper trade or the publishing business must make it look rather more like a philanthropic effort than a business speculation on the part of the producers.

One hopes that the Subaltern Flying Officer will appreciate the gift which the author has given him out of his own vast store of experience, for the book contains the concentrated knowledge of many expensive years in tabloid form, or perhaps one should say in condensed milk form, seeing that it is easy to swallow and agreeable to the taste, as well as wholesome and nourishing. And, besides the young Service aviator, there are thousands of young men, and women also, now employed in the Aircraft Industry, who will appreciate far better the value of the finnicky little jobs they are doing if they will read this book and see how vital is their work to the man who flies. Which is why this review is put into the section of this paper devoted to aeronautical engineering.

A Record of Experimentation.

It may, perhaps, be well to give the younger generation of aeronauticists a brief sketch of Captain Barber's aeronautical career, for it will help them to understand his close understanding of the aeroplane, an instrument which to the old-timer is as live a thing as is his violin to any musician, and far more a live thing than are some of the thick heads into which one tries at times to drive knowledge and appreciation of aircraft.

My first recollection of the author of this book was when he was experimenting at Lark Hill, on Salisbury Plain, with a queer "tail first" monoplane, which he later called the "Valkyrie," some time in 1910.

No one then knew whether an aeroplane ought to fly tail first or head first. The first aeroplanes to fly at all, the Wright in America and the Santos-Dumont in Europe, had front elevators, which looked like tails, and they had no tails behind the main planes. Moreover, all the best model aeroplanes, generally driven by elastic, had small leading planes, and these things

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were inherently stable, self-gliding, and self-landing for years before any man-carrying aeroplane even began to think about being inherently stable.

Consequently there was every reason for experimentation with the leading-elevator, tail-first, or *canard* type of machine, as it was variously called, the last title being given because the front elevator and absence of tail gave it something of the aspect of a duck in full flight, though the Voisin and Blériot *canards* were far more duck-like than was the Valkyrie.

THE ONLY SUCCESSFUL "CANARD."

It is to the credit of Mr. Barber that he achieved far more success than did any other designer of *canards.* With a few friends he formed the Aeronautical Syndicate, Ltd., and that firm produced Valkyries which really did extraordinary flights. Mr. Barber himself was an astonishingly skilful pilot of the type, and his journeys across country, especially one with a passenger to Brighton and back in very bad weather, equalled the best of the period, and beat the average.

However, there were undoubted aerodynamic disadvantages about the type, and it was eventually abandoned. It must be said, however, that the workmanship of the Valkyrie has never been surpassed, and the detail design was certainly in the first class for its period, for these were two points of which Mr. Barber made a hobby.

In January, 1912, just before the Aeronautical Syndicate closed down, Mr. Barber produced a twin-tractor biplane, with the engine in front and with a fuselage and tail. This type of machine, which he christened the "Viking," would have done great things if it had been developed before war broke out, but, as usual, the High Authorities were not interested, so the Syndicate sold up the business in April, 1912, and retired, the members of the Syndicate paying all its debts to the last penny, which, as it was a limited company, they need not have done—an example of conscientiousness which is notable rather stands out in the history of commerce.

Thereafter Mr. Barber's connection with aeronautics became somewhat academic till war broke out, though in the interim he designed and patented an airship of a type which still holds great promise. It was intended to be built of wood, for which reason it would certainly give Germany the impression that there is a shortage of aluminium in England if one were built here now and presented to Germany, as seems to be our kindly custom with our new aircraft. It was cheap and easy to produce, and it had many advantages, but it had the great disadvantage that it was not invented by any official person, nor by any person with official influence, so, like many another good idea, it was ignored.

Soon after war broke out, Mr. Barber joined the R.F.C., and again took to flying, acting for some time as an instructor at Farnborough. Those who served with him say that his skill and address on modern machines were as great as on the old Valkyrie. Since then his engineering ability has been put to better use as instructor on the mechanical side of the R.F.C.

HOW THE AEROPLANE SPEAKS.

However, to return to the book itself. I am tempted to wonder whether Captain Barber would have written the Prologue if Mr. Kipling had never written "The Ship that Found Herself" or ".007"; but whether or no, the portion of the book in which the "Elementary Principles Air their Grievances" and the three succeeding sections makes highly entertaining reading, in which a vast amount of instruction is imparted without one's being aware of being lectured. Incidentally, the saving grace of humour adds very considerably to the entertainment, and the author contrives ingeniously to demonstrate how Miss Efficiency, the *inamorata* of the Designer, is continually being compromised by these same Elementary Principles and the necessities which know no law.

There are also sundry little sly digs at Flying Corps peculiarities which will be vastly entertaining to the old hands in the Corps, and may even be recognised by new-comers, to their advantage.

Parts III and IV of the Prologue are as fine a picture of test and cross-country flying as have ever been written. Many a young designer will sympathise with Miss Efficiency, when in the course of the Great Test she remarks, "If we could only get rid of the Directors [Company, not Military.—C.G.G.], the little Tin god, and the Man-who-takes-the-credit, we should be quite happy," even though Boards of Directors, and Brass Hats, and Orders and Dividends may be recognised as necessary evils.

It is sometimes considered a reproach to have written poetry, real poetry, of course, and not merely prose in verse, but one cannot help stating that into the passage following the 6,000 climb in the test Captain Barber has compressed more poetry, albeit in prose, than has yet been printed on the beauty of flying, despite the many verses on the subject which have appeared.

The conversation of the parts of the machine during the test is highly entertaining and astonishingly real, for, as the author says, "That is the way Aeroplanes speak to those who love them and understand them. Lots of Pilots know all about it, and can spin you wonderful yarns, much better than this one, if you catch them in a confidential mood—on leave, for instance, and after a good dinner."

MERE MECHANICS AND DYNAMICS.

The part of the book dealing with mere dynamics and mechanics, though less amusing, is as easily read and as highly instructive. The very elementary portion dealing with lift, drift, aspect-ratio, head-resistance, cambers, streamlines, and so forth, puts all the facts connected therewith in simple language and yet not in the childish manner of the average school-book. The exposition on the Minimum Angle of Incidence, the Maximum Angle, the Optimum Angle, and the Best Climbing Angle, will enlighten a good many young students of aeronautics, and will perhaps assist in producing the "brilliant inventor" who "will design an aeroplane of reasonable weight and drift, of which it will be possible for the pilot to vary at will the opposing essentials," and so "get maximum velocity, or maximum margin of lift, for power as required." For "until then the design of the aeroplane must remain a compromise between Velocity and Climb."

STABILITY.

The chapter devoted to stability is no less illuminating, though one notices a slight but important omission. The author says:—"The gyroscopic action of a rotary engine will affect the longitudinal stability when an aeroplane is turned to right or left. In the case of a Gnôme engine, such gyroscopic action will tend to depress the nose of the aeroplane when it is turned to the left and to elevate it when it is turned to the right." It all depends whether the machine is a pusher or a tractor. In this case the remark applies to a "pusher."

Though as a matter of fact the author is correct in saying "In modern aeroplanes this tendency is not sufficiently important to bother about,"—owing, be it understood, to the powerful controls on a fast modern machine, it is still wise to be respectful to the gyroscopic force of a rotary engine on the slow school machines which are in use even to-day.

Also, I am inclined to question his statement that "lateral stability is far more difficult for the designer to secure than is longitudinal or directional stability." Seeing that more fatal accidents occur through "spinning" than from any other cause due to defective sta-

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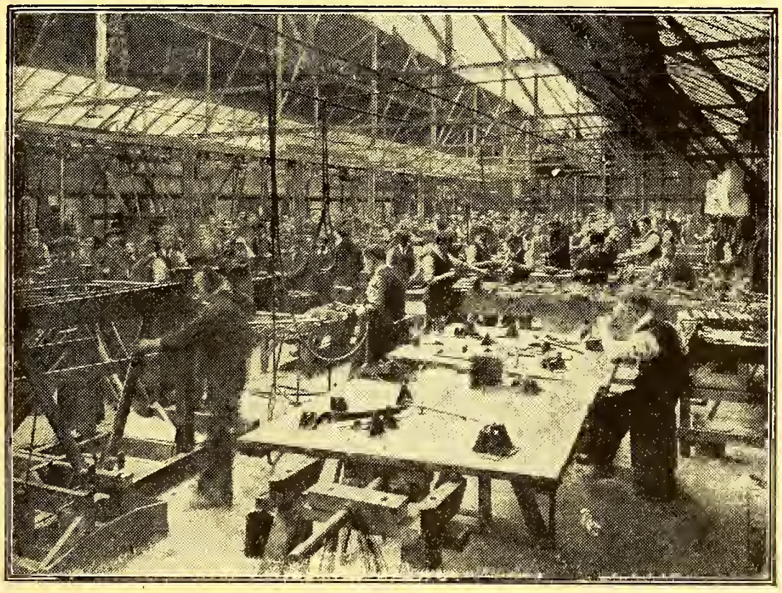

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bility, and that spinning is evidence of defective directional stability, I am inclined to back directional stability as the most elusive.

However, all three are so closely interlinked in the chain of cause and effect that one might debate the subject for hours without settling it. For of course most spins begin with stalling, and so may be caused by defective longitudinal stability aided by defective lateral stability.

Rigging.

The chapter on rigging an aeroplane, that is to say, erecting a machine and truing it up, is all too short. It is a subject on which very little has been written and one on which very much might be written. Starting by explaining simply what stresses and strains and factors of safety, and such things, are, Captain Barber goes on to the Conditions to be Observed, in rigging an aeroplane, accompanied by paralysing pictures of a strut bent by incorrect wiring, and of a badly bedded strut.

Such things as the Functions of Interplane Struts, Boring Holes in Wood, Locking Bolts, Adjustment of Turnbuckles, are all handled competently, and the three and a half pages devoted to Wiring is none too much.

People who fancy they know quite a lot about aeroplanes will learn a good deal more from the sections on truing up a machine for the correct angle of incidence, dihedral, and so forth. How many, for example, know how to use a "dihedral board," or how to adjust for stagger?

Another most valuable section is that concerning "How to Diagnose Faults in Flight, Stability and Control," and it is strongly commended to designers and constructors, as well as to pilots and equipment officers.

One only hopes that when the book goes into a new edition, as it must do before long, Captain Barber will expand the whole chapter on Rigging. For example, he can well afford to explain the reasons why (1) distorted surfaces, or (2) too small an angle of incidence mean a bad climb, and why (1) distorted surfaces, (2) too great an angle of incidence, or (3) dirt or mud, and consequently excessive skin-friction, mean poor speed.

One is quite willing to take his word for it, but one "wants to see the wheels go round," and he has too fine a gift of explaining "why" for one to let him off with a mere statement that it is "because."

The Propeller.

The chapter on propellers is also full of information, and one does not recall having seen in common use his method of weighing a propeller at various points along its length, as illustrated on page 121.

The explanation of pitch, illustrated by the two pilgrims toiling up a mountain, is highly ingenious, and a truly Barberian piece of humour.

Maintenance.

Those who remember the way in which the old Valkyrie machines were kept in order will recognise the hand which wrote the chapter on maintenance. In those days the average aeroplane shed looked like a cross between a parrot's cage and butter-slide, but the Valkyrie sheds were a model of neatness and cleanliness which would set an example to any military shed to-day.

Also, the Valkyrie monoplane was a maze of wires with an engine and propeller howling round in the middle of it, so that if anything had ever come unstuck it was bound to be "mopped up by the screw"—as Mr. Kipling said. So far as I can remember, the only victim of a Valkyrie propeller was a finger of poor little Miss Trehawke Davies—now, one hopes, attained to her heart's desire of eternal aviation.

Things did not come unput in the Valkyrie because of the strict maintenance order,—unlegal, but none the less stringent—which was always in force.

The rules laid down in this chapter should be printed in large letters, and learned by heart by every air mechanic, Naval, Military, or civilian, who should be made to repeat them by way of grace before breakfast, and before saying his prayers when going to bed at night.

If Captain Barber can think of any more rules, he should embody them in his next edition, and he might well add to each paragraph in this chapter an explanation of its why and wherefore.

For example, why should struts and sockets be examined to see if any splitting has occurred? What might cause them to split, and what would happen if they did? Why should pulleys, control levers, and hinges be well greased? What might happen if they were not? It sounds silly, I know, but there are heaps of fool mechanics still who put petrol in the oil tank, and look for the key with which to wind up the rev.-counter.

A Real Glossary.

Following on the instructional matter proper is a Glossary of technical terms, with plates attached illustrating the parts. This is the most complete thing of its kind yet produced, and it is also accurate. There are curious omissions, such as the word "aneroid," and the author might have included certain slang terms now become classic, such as "bump," "dunt," "crash," "chukker," and so forth; but after all, if one started on that sort of thing one would have to write a dictionary and not a glossary. Many a newcomer to aeronautics will bless that glossary, and will dine out on it as an aeronautical expert for weeks.

Types of Aeroplanes.

At the end of the book Captain Barber has seen fit to reproduce all the "Milestones" drawings by Mr. Geoffrey Watson which appeared during 1915 as frontispieces to The Aeroplane. Excellently printed on really good plate paper they certainly form a unique pictorial record of the development of the aeroplane from Ader's "Avion" of 1897, Santos-Dumont's *canard* of 1906, and the Wrights' biplane of 1907, right down to the war machines of 1915.

The leading firms' machines appear in order of development. For example, one plate shows the nine steps in the growth of the Avro, from the 1907 biplane to the war biplane, through three types of triplanes.

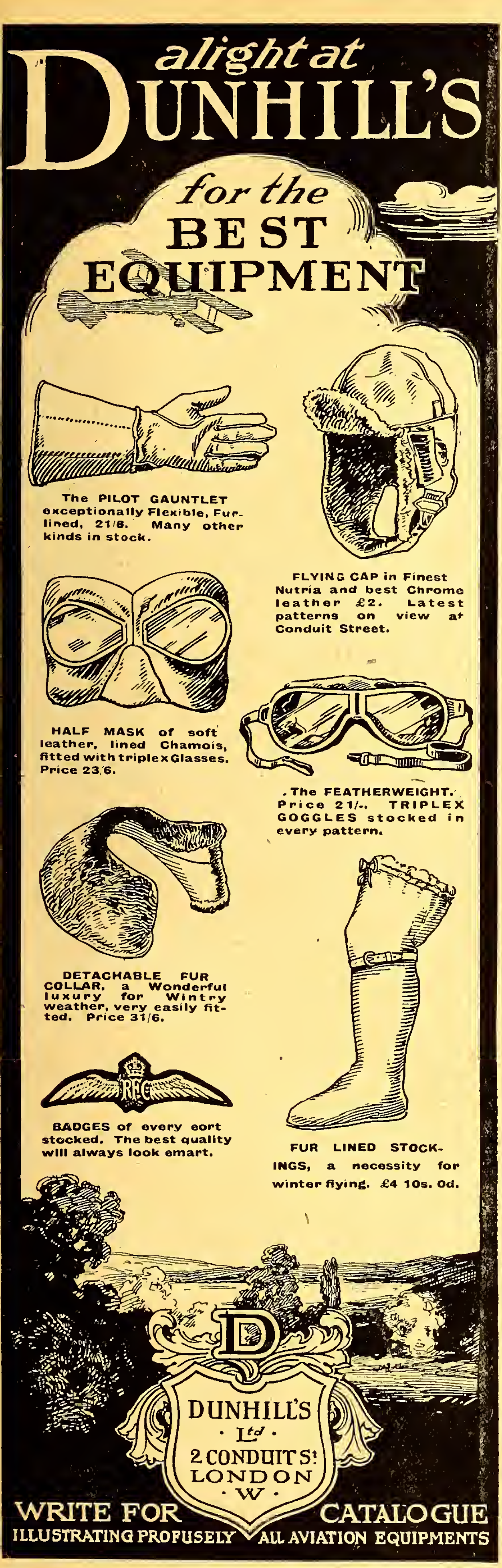
Some people might think that these 36 plates were alone worth the money, but one can assure those who wish to learn about aeroplanes that these pictures are merely "make-weight," and that without them the book itself is full value.

Illustrations.

The book throughout is splendidly illustrated by Mr. Fleming-Williams, now an Equipment Officer R.F.C., whose work is well known to readers of this paper, and who was about the first professional artist who learned to draw an aeroplane which looked like one. His illustration of the interior of a wing is particularly valuable, and so are his diagrams of aeroplanes in various attitudes, and the diagram of a modern cock-pit with its "switch-board-full of nickel-plated muckin's."

All his drawing is good, even the drawing of the frontispiece—*qua* drawing, though I wish it had been left out, not because it is bad, as a picture, but because it may give a wrong impression to a person picking up the book casually in a shop. It is always a mistake to illustrate an allegory, if the words are good, and to ilustrate Captain Barber's allegorical Prologue is like gilding the lily, or salting the red herring. The sketches of aeroplanes and their attitudes in the Prologue are excellent, and thoroughly in place, but that frontispiece worries me. Better leave it out of the next edition.

Still, if people will insist on selling a guinea book for half a dozen shillings, I suppose they are entitled to make one error of judgment and still be the creditors of their readers, and certainly all the younger generation of aeronautical enthusiasts will be deeply indebted to the author of "The Aeroplane Speaks." C. G. G.



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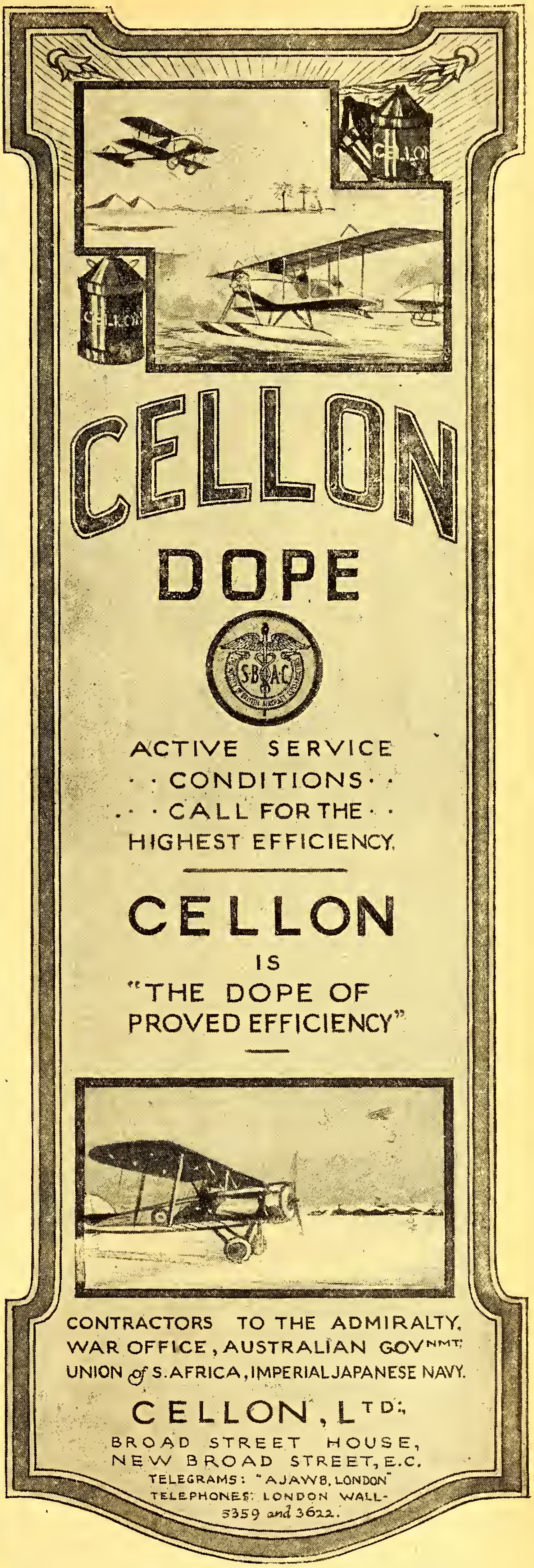

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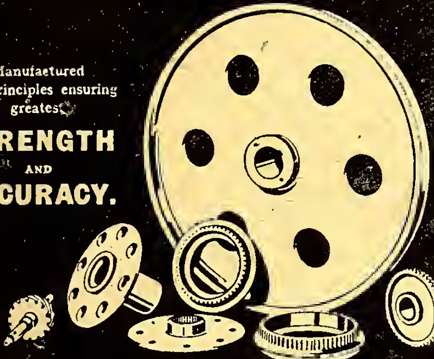

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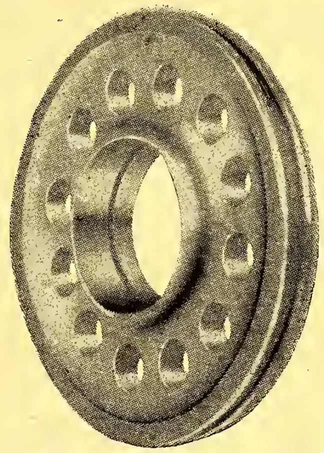

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Reported Jan. 19th.

KILLED.—Hopper, Sec. Lt. R., R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED WOUNDED AND PRISONER OF WAR IN GERMAN HANDS.—Parker, Sec. Lt. J. K., R. Scots Fus., attd. R.F.C.

PREVIOUSLY REPORTED PRISONER, NOW REPORTED WOUNDED AND PRISONER IN GERMAN HANDS.—Roberts, Sec. Lt. C. L., S. Lancs. R., attd. R.F.C.

Reported Jan. 20th.

WOUNDED.—Segrave, Capt. H. J., Wiltshire Regt., attached R.F.C.

Kingsley, Lt S. G., R.F.C.

Reported Jan. 22nd.

MISSING.—Bentley, Sec. Lt. G. W., Royal Fusiliers and R.F.C.

Hinkley, Sec. Lt. D. R., York and Lanc. Regt., attd. R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER IN GERMAN HANDS.—Clark, Sec. Lt. W. B., Yeomanry, attd. R.F.C.

KILLED.—R.F.C.—Dinnage, 1568 Cpl. G. (Horsham).

DIED OF WOUNDS.—R.F.C.—Oxley, 7768 2nd Cl. Air Mech. R. (Newhaven).

DIED.—R.F.C.—Foye, 17899 1st Cl. Air Mech. T. (Glasgow).

WOUNDED.—R.F.C.—Harrison, 9152 2nd Cl. A. M. J. (Birmingham).

Bulmer, 22177 1st Cl. Air Mech. L. V. (Craighead).

Chappell, 24208 Act. Cpl. J. (Manchester).

Hadley, 46641 2nd Cl. Air Mech. L. (Brixton, S.W.).

Newman, 40941 2nd Cl. Air Mech. J. (Pimlico, S.W.).

Reported Jan. 23rd.

KILLED.—Exley, Sec. Lt. G. A., Yorkshire L.I. and R.F.C.

WOUNDED.—Haynes, Lt. G. W. N. R., R. Munster Fus., attd R.F.C.

PREVIOUSLY REPORTED PRISONERS, NOW REPORTED WOUNDED AND PRISONERS IN GERMAN HANDS.—Cook, Sec. Lt. L. C. L., A.S.C. and R.F.C.

Raymond-Barker, Sec. Lt. A. B., R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED WOUNDED AND PRISONER IN GERMAN HANDS.—Kelly, Sec. Lt. C. M., R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER IN GERMAN HANDS.—Mitchell, Sec. Lt. H. B. O., M.C., R. Innis. Fus. and R.F.C.

WOUNDED.—R.F.C.—Bower, 9279 Cpl. A. O. (Landore, Mussoorie, India).

PERSONAL NOTICES.

DEATHS.

BOLITHO.—Sec. Lt. Geoffrey Richard Bolitho, Devon R., attd. R.F.C., fifth and youngest son of the late Capt. Edward Bolitho, R.N., and of Mrs. Edward Bolitho, Rockbeare House, Exeter, and grandson of the late Mr. T. S. Bolitho, of Trengwainton, Cornwall, who had been missing since Oct. 25th, is now reported killed. He was educated at L'Ecole de l'Ile de France, at Wellington College, and at Trinity College, Cambridge. On the outbreak of war, having just left Cambridge, he was given a commission in the Devonshire Regt. He went out to France in March, 1915, and last May he transferred into the R.F.C. He became an observer, and was wounded in August. During a bombing expedition over the German lines in October his machine was brought down by the enemy. Mr. Bolitho, who was the youngest of ten children, was born in 1893. He has three brothers now serving at the front and one brother in the Navy.

* * *

EXLEY.—Sec. Lt. George Allan Exley, King's Own (Yorkshire Light Infantry), attached R.F.C., killed, was a son of Mr. and Mrs. J. Exley, of Farr Royd, Burley-in-Wharfedale, and was 23 years of age. At the outbreak of war he enlisted in the R.E., and was in training as a dispatch rider at York. He subsequently transferred to the King's Own Yorkshire Light Infantry, and got a commission. Being interested in mechanics, he joined the R.F.C. about 12 months ago.

* * *

HOPPER.—Sec. Lieut. Raymond Hopper, R.F.C., killed, was the son of Mrs. Hopper, 114, Coltman Street, Hull, and was educated in the ancient Grammar School of that City. Before joining the R.F.C. he served six months in France with the Public Schools Battalion of the Royal Fusiliers.

* * *

JENKINS.—Capt. Roy Jenkins, R.F.C., of Bridgend, South Wales, was accidentally killed while flying in England on Jan. 21st.

* * *

PORTER.—Capt. Leslie Porter, R.F.C., who has been missing since Oct. 23rd last, is now reported to have died of wounds in Germany. He was a son of Capt. David Porter, R.A.M.C., Donegal, and was a pioneer of the motor industry in the North of Ireland, having founded the firm of Leslie Porter (Limited). He was an ardent racing motorist, and took part in the Paris-Madrid race. On that occasion his car was upset, and his companion, Mr. Nixon, was killed. Last August Capt. Porter flew from England to Belfast, and made several flights over the city.

* * *

RAVENSCROFT.—Lieut. Alan Paddock Ravenscroft, R.F.A., attd. R.F.C., died on Jan. 17th in his 25th year, at the Royal Herbert Hospital, Woolwich, as the result of an accident while flying. He was the elder son of Mr. and Mrs. F. A. Ravenscroft, late of Wallasey, Cheshire, and was educated at Elleray Park, Wallasey, and Malvern. At the outbreak of war he was farming in the Argentine. He came home and received a commission in the R.F.A. He was at Suvla Bay until the evacuation, and returned to Egypt with his regiment, and came to England last August. He transferred later to the R.F.C.

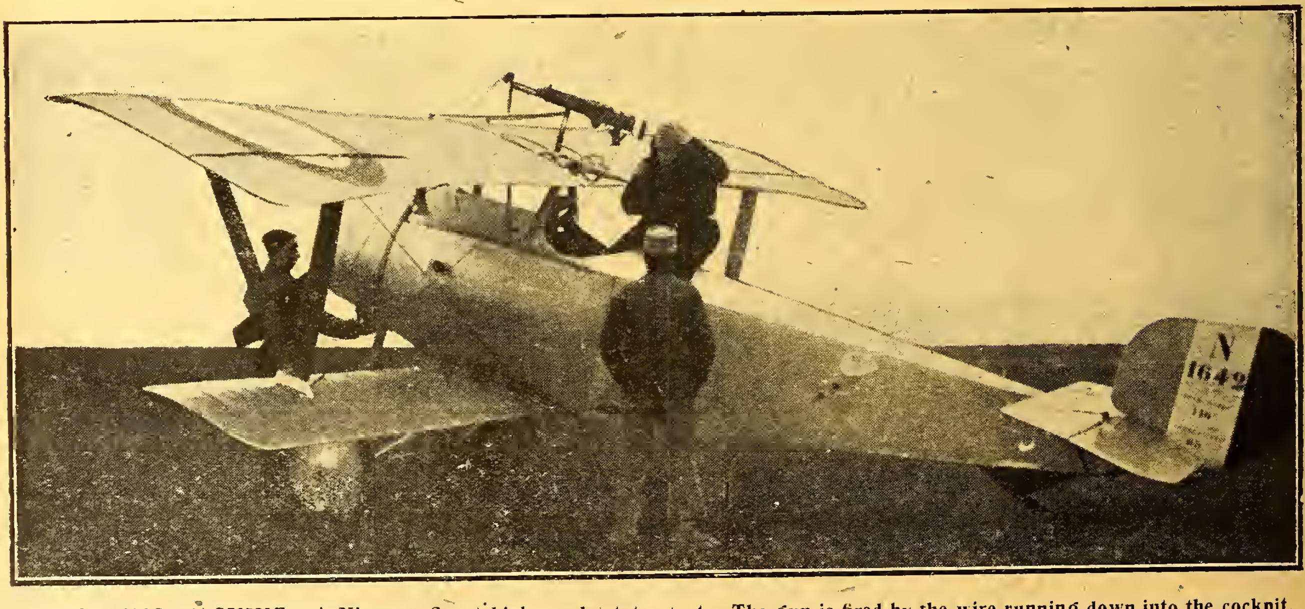
The evidence showed that whilst flying near Croydon the deceased attempted to alight in a field, but the aeroplane went too far, crashed into some trees, and overturned. Mr. Ravenscroft's head struck a tree-stump, which fractured his skull. One of his brother-officers stated that there appeared to be nothing wrong with the machine, and apparently Mr. Ravenscroft made an error of judgment in landing. A verdict of accidental death was returned.

* * *

SAMUELS.—Sec. Lt. George Bernard Samuels, D.L.I., attached R.F.C., reported missing on Oct. 22nd last, now reported killed, was the youngest son of Mr. and Mrs. David Samuels, 105, Brondesbury Road, N.W.

* * *

STANLEY.—First Class Air Mechanic Stanley, R.F.C., was fatally injured on Jan. 18th while flying at Hounslow Aerodrome. He had risen to a height of about 100 ft., when the aeroplane



A FIGHTING MACHINE.—A Nieuport Scout biplane about to start. The gun is fired by the wire running down into the cockpit.

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nose-dived and fell to the ground. Stanley died while being taken to hospital.

A verdict of "Accidental death" was returned at an inquest at Hounslow on Jan. 20th on the body of Air Mechanic Raymond Stanley, killed whilst flying. Evidence was given that Stanley, who was an experienced pilot, rose well, but in turning at a low altitude failed to bank, with the result that the aeroplane nose-dived to earth. Stanley was the son of an ironfounder at Evesnal.

* * *

VAVASOUR.—Lt. Rollo Vavasour, R.F.C., died on Jan. 16th, after an operation. He was the second son of Mr. and Mrs. Henry Vavasour, of Ugbrooke, New Zealand, aged 23. A funeral service was held at Our Lady of Rosary Church, Marylebone, on Friday, 19th.

Engagement.

FOSTER—FAIRFAX-BROWN.—A marriage has been arranged between Lt. R. Duncan Foster, Royal Garrison Artillery, attached R.F.C., and Hilda, only daughter of Mr. B. Fairfax-Brown, of The Mount, Baschurch, near Shrewsbury.

Marriages.

BRYANS—RAMSBOTHAM.—On Jan. 20th, at St. James's, Sussex Gardens, by the Rev. J. L. Bryans, Vicar of St. John's, Builth Road, assisted by the Rev. A. E. Lee, Curate of St. Stephen's, Avenue Road, N.W., Capt. W. B. Bryans, Norfolk Regt., Adjt. R.F.C., son of Mr. and Mrs. Arthur Bryans, of 8, Talbot Square, Hyde Park, and The Holmwood, Surrey, was married to Mildred Isobel Ramsbotham, daughter of the late Lt. T. Ramsbotham, R.N., and of Mrs. Ramsbotham, of Enniskerry, Exmouth.

* * *

GARNETT—OATLEY. — On Jan. 15th, at Clifton Parish Church, by the Rev. J. A. Dodd, Vicar of Winscombe, assisted by the Rev. E. S. S. Caudwell, Rector of Backwell, William Patrick Garnett, Lieut., Royal Berkshire Regt., attd. R.F.C., eldest son of Mr. and Mrs. William Garnett, of Backwell, Somerset, was married to Mary Whiddon, youngest daughter of Mr. and Mrs. G. H. Oatley, of Church House, Clifton, Bristol.

* * *

HILTON—WOODIN.—On Jan. 16th, at St. James's Church, Yarmouth, Isle of Wight, by the Rev. A. H. Hitchcock, of All Saints', Clifton, Lt. Richard Hilton, R.G.A. and R.F.C., son of Mr. J. E. Hilton, J.P., of Lambourn, Berks, was married to Phyllis Martha, eldest daughter of the Rev. Stanley H. Woodin, Rector of Yarmouth, I.W., and of Mrs. S. H. Woodin.

* * *

SOUTHGATE—COYSH.—On Jan. 18th, at St. Andrew's Church, Westminster, Trevor Davidson, Sec. Lt., the Essex Regt., attached R.F.C., only son of Thomas Bishop Southgate, Esq., of Rio de Janeiro, was married to Vera Murdoch, elder daughter of Maj. W. H. Coysh, R.E., of Rose Bank, Dovercourt.

Births.

HENDERSON.—On the 18th inst., at 12, Strathmore Gardens, Kensington, the wife of Capt. Neville Henderson, Brig.-Maj., R.F.C., of a daughter.

* * *

KEDDIE.—On Jan. 14th, 1917, at "Maes-y-bryner," Chadwick Road, Westcliff-on-Sea, the wife of F. Wallace Keddie, Sec. Lt., R.F.C., of a son.

The courage and presence of mind of a wounded soldier was warmly commended at an inquest held on Jan. 17th on the body of Sec. Lt. Thomas H. French, who was killed while flying in a snowstorm on Jan. 13. Gnr. Charles Briernall, a wounded artilleryman, said he saw the machine come down in flames. He rushed across fields to the scene of the accident, and found the aviator on fire with his head pinned under the machine. With difficulty he extricated the body before it was more than slightly burned. A verdict of "Death from misadventure" was returned. Capt. and Adjt. Cash expressed the great appreciation of the officers and men of the R.F.C. of the courage and presence of mind of the wounded soldier in pulling the body of Lieut. French from the burning machine, an act which they hoped would receive some public recognition.

* * *

A British officer now a prisoner at Ohrdruf, writing on Nov. 26th, 1916, to the father of his passenger, who died of wounds, says:—"You cannot think how I feel for your loss in the death of your son. It was on Sept. 15th (as I expect you have already heard from Major ——) that it happened. Your son's machine gun would not work properly at the time we were attacked by three German machines, one of which got behind our machine, and one of his bullets caught the petrol pipe and also went into my foot. It must have been this machine which fired the shots into your son. I think two penetrated his chest. The place where we landed was good ground, and your son's first thoughts were to burn the machine, but it was in his attempts to do so that he collapsed.

"There was a dressing-station about half a mile away, and I got some German soldiers to carry your son there. After the first dressing-station we were carried on stretchers to a place on a road where we had to wait for horse ambulance to take us to the next dressing-station.

"We had to wait some time, and it was there that your son died. His last request to me was, 'Write to my people and tell them that I am all right'; he then tried to give me your address, but was too weak.

"After a long ride in the horse ambulance I was lifted out, and the body of your son was also taken out. There was a German officer there who told me that your son would have a proper burial, and that anything that was found in his pockets would be sent to the English War Office. I am very sorry to say that I do not know the name of the second dressing-station, but I am making inquiries and will let you know as soon as I have any information.

"Two days later, when I was at a hospital, the aviator who caused most of our misfortune came to see me, and was certainly very kind to me. He expressed the deepest regret at having been the cause of your son's death.

"I am sorry that I cannot give you more information, but after I was wounded I lost a great deal of blood and did not feel very well."

FRANCE.

It was reported from Paris on Jan. 16th that the Académie des Sports has awarded to Lieut. Guynemer, the famous aviator, its Grand Prize of £400, established by M. Deutsch de la Meurthe. Lieut. Guynemer, who has brought down 25 enemy machines, has won the Legion of Honour, the Medaille Militaire, and the Croix de Guerre.

* * *

M. Bernard, the French and European middleweight champion, was the victim of a fatal accident at the Military Aviation School at Pau on Jan. 20th.

At the end of 1915 he was a motor-driver in the 2nd Aviation Group, and then became an aviator. While making a corkscrew descent his machine crashed to the ground, killing him on the spot.

He was 22 years of age. The finest victories of his career took place in 1912 over Jack Meekins and Arthur Evernden. Victories were also recorded over Badoud, Willie Lewis, Curley Davies, Blink MacCloskey, Young Thompson, and Nichol Simpson.

GERMANY.

Official Communiqué.

Jan. 17th.—In spite of the fact that the unfavourable weather conditions considerably restricted aerial activity in the middle of December, our aviators and anti-aircraft formations succeeded in causing considerable losses to the enemy. We lost 16 aeroplanes, whereas our enemies lost 66, of which 48 were brought down in air fights, 16 were shot down from the ground, and 2 were forced to land. Twenty-two of these machines are in our possession, while 44 were observed to fall on the other side of the line.

* * *

It is reported from Amsterdam that an aged German, who arrived at that city recently, told how he brought up a family of eleven sons, every one of whom entered the air service. The eleven young men formed part of the crew of one of the destroyed Zeppelins, and when this fell in flames in England they all perished.

"My only consolation," said the father, "is that they died for the Fatherland."

[It is not clear whether the liar was the aged German or the journalist who told the story.—Ed.]

RUSSIA.

Official Communiqués.

Jan. 16th.—Our aviators dropped bombs on Barjarni and Sudami on the Danube in the region of Braila, and caused fires on some vessels.

Jan. 22nd.—In the neighbourhood of our position south of Brzezany, Lt. Grasse, an aviator of the French Service, attacked a German aeroplane, which fell into the enemy's position near the village of Skomorochy (on the River Narajowka, north of Halicz).

AUSTRIA.

Official Communiqué.

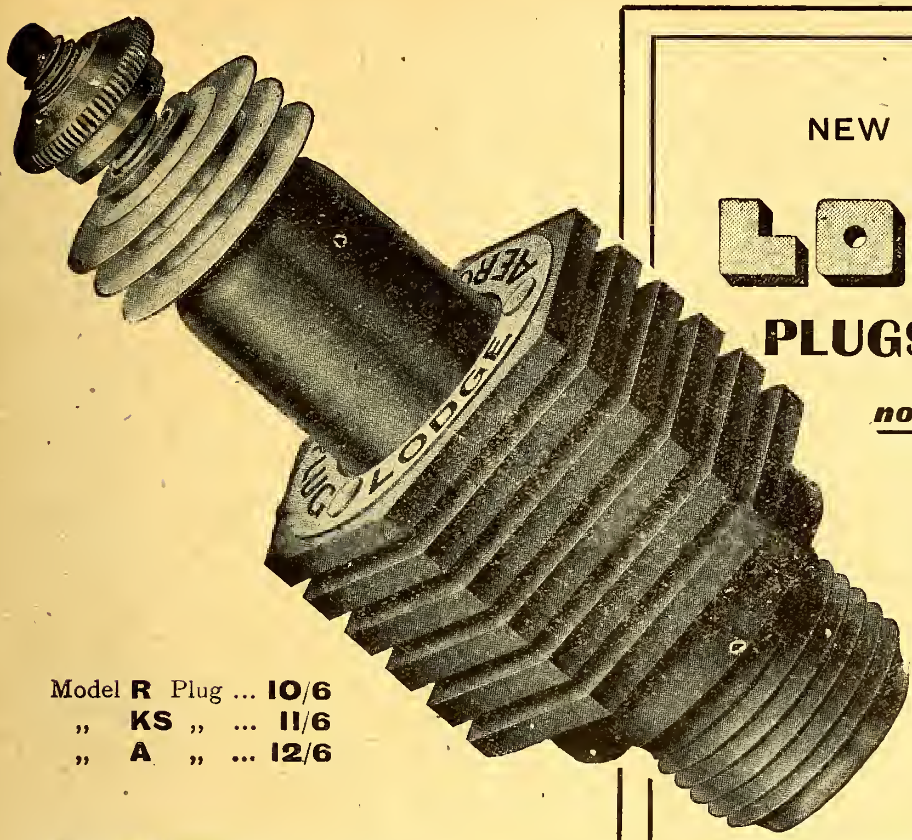
Jan. 21st.—An Austro-Hungarian aviator compelled an enemy aeroplane to descend near Maramaros-Sziget (in Hungary). The machine and its occupants fell into our hands unhurt.

ITALY.

Official Communiqués.

Jan. 17th.—On the morning of the 14th inst., near the Dalmatian Islands, an Austrian vessel was torpedoed and sunk by a French submarine attached to the Italian naval forces. The submarine was unsuccessfully attacked by an Austrian aeroplane.

Jan. 18th.—On the Carso the enemy's artillery and aeroplanes were more active against our first lines. Our batteries vigorously replied and hit two aeroplanes, one of which fell perpendicularly near Brestovica. The other, turning over several times, fell near Casta Pravizza.



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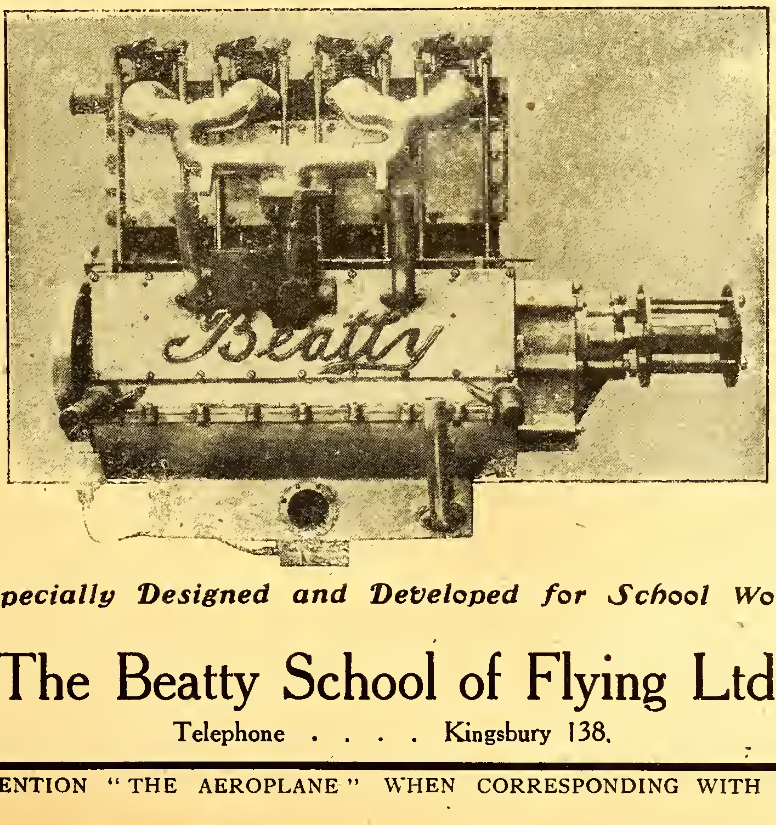

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On 4th inst., at Sesto Calende (Lago Maggiore) the tester Angelo Guenzi, in the employ of a hydroplane firm there, took a Savoia waterplane with Isotta-Fraschini motor up to 5,800 metres, claimed as the record.

These recent flights and other matters have produced a feeling of cheerful satisfaction among flying men in this country.

One is pleased to learn that the Dep. patents are being drawn upon too, and that Spain's chief motor glory has not been neglected either. All good roads lead to Berlin!

* * *

There are some definite signs of relaxation of the regulations as to hiding from enemy aircraft in some of the smaller and less-protected Venetian towns, and one even hears of bell-ringing and clocks striking. Which only confirms the remarks in the H.Q.'s report which I sent you yesterday.

I have been allowed to examine a publication issued by the Supreme Command of the Italian land forces which deals with aeronautics among other subjects. A number of photos taken from Austrian prisoners are of great interest, and show, among much which one had already learnt, the fact that nothing but 6-cylinder vertical engines, each with a different radiator-mounting, and all with the fashionable trumpet exhaust pipes, are in use among them.

The positions of the said radiators might well illustrate a treatise on water-cooling! One position for this delicate organ, favourel of the Aviatik people chiefly, is at a very negative angle of incidence just forward of the entering edge of the upper plane. A few machines, which were brought down in flames, show all-metal wing-construction.

A Roman statement that Athens is keeping in touch with her friends by aeroplane seems probably true. Where the invisible is barred the visible gets through, i.e., Wright scores over Marconi.

* * *

A Headquarters Report is just out, and deals with the warfare of the last three months of 1916 on this front. Matters aerial are generously treated, and the few extracts from the report which follow below are sufficient to sum up things with due respect for the present value of space.

"Warfare in the air was very intense during this period, and strictly limited on our part to military objects, respecting, too, absolutely and constantly the usages of war and the laws of civilisation and humanity.

"Our dirigibles took part in this activity by daring night raids on the Duino-Trieste railway (Sept. 9th), on the stations of Dotogliano and Scoppo (Sept. 25th), and on enemy columns marching from Comeno to Castagnizza (Sept. 27th).

"The enemy, according to his wont, preferred to make war on the inhabited centres of the Venetian plain and the Adriatic seaside places. The efficiency of our defence system was frequently successful in counteracting and in every case in attenuating the effects of his incivil temper. In the course of events there were many brilliant flights, and 13 enemy machines were brought down. Our loss was of four only: so we kept our absolute superiority also as regards material."

* * *

The F.I.A.T. Co. announce a very considerable increase of capital wherewith the better to furnish their country with power plant and things on which to mount the same.

* * *

Another large (new) firm building all-metal biplanes has been much mentioned in the technical and sporting Press lately—viz., that of the engineer O. Pomilio and Co., at Turin and Milan. Illustrations show "shops" spacious to the extreme. The name is, of course, as well known as any to pre-war readers of this journal.

* * *

Another concern known as a promising beginner at the end of '14 is now actually in the position to export its speciality—a fast and powerful single-seater—by scores to a big Ally.

* * *

A young friend of mine, who after three years' soldiering and one in the trenches has been detached to the Flying School at Centocelle, is horrified at the "thoroughness" of the training there, and considers himself a fixture there for the rest of this and some part of the next war. Familiarly, he is now called by his brothers, the "Embusqué,"

The evil breezes of the Eternal City seem to have little effect on the Caudrons and Farmans which are mostly used for training the young hands at that place.

* * *

I note the arrival of a British Government film of "enlightenment" at Milan. Tanks and other bright things are to be shown us. Meanwhile, the local "food regulations" are extended to officers' messes in the war zone.—T. S. Harvey.

BULGARIA.

Official Communiqués.

Jan. 17th.—Four enemy aeroplanes which were flying over Tulcea were driven off by our artillery fire.

Lt. Burchardt brought down a British aeroplane in the Strumitza Valley.

Jan. 18th.—In the Vardar Valley and on the Struma the enemy's aviators were active.

GREECE.

It was reported from Geneva on Jan. 22nd that King Constantine is not only in wireless but in almost daily postal communication by aeroplane with Vienna and Berlin.

The aeroplanes land at pre-arranged spots outside the Greek zone occupied by the Allies.

MESOPOTAMIA.

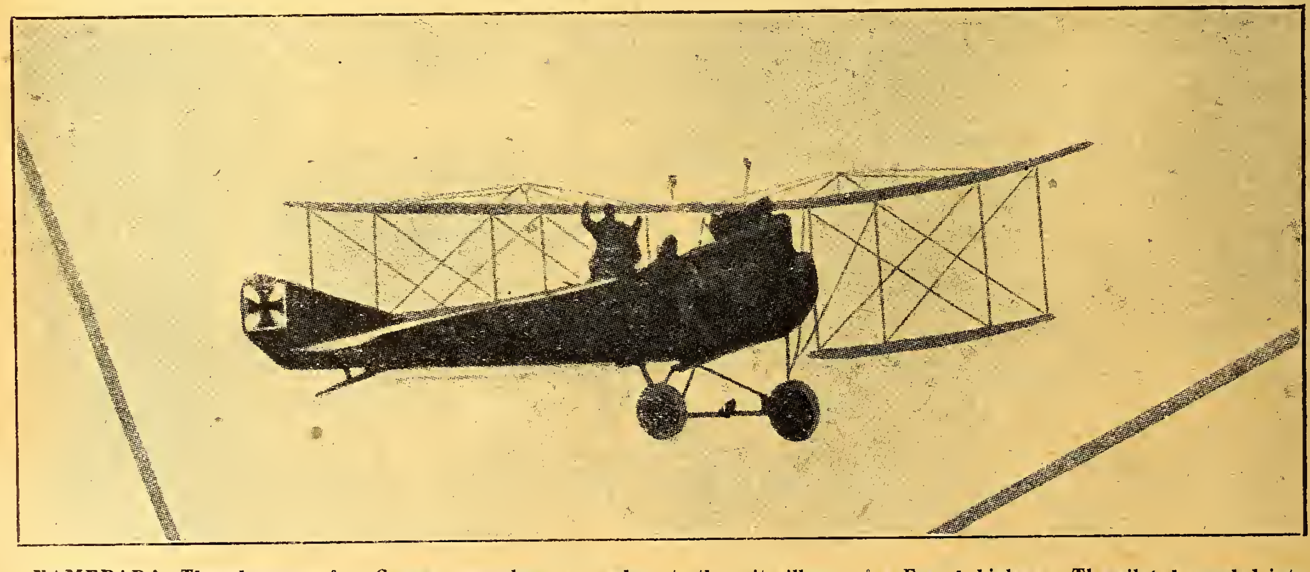
It is reported from Mesopotamia by Mr. Edmund Candler, in describing the operations against the Turks on the Tigris about Jan. 15th, that an aeroplane which had just come in reported our cavalry at Hai town.

CANADA.

The "Canadian Gazette" (London, England, not London, Ont.) says:—

"Lieut.-Col. Hoare, an Imperial officer, is leaving for Canada to assume the post of Commandant of the new Imperial Flying School now about to be established there. The British Treasury have sanctioned the establishment of 20 reserve squadrons in the Dominion. Lieut.-Col. Rees was to be in command, but he is unwell. Capt. Innes-Kerr, who is now in Canada, will be second in command, and 11 other officers of flying and constructional experience are being sent forward in the near future. There will also, of course, be scope as officers for Canadians who have shown their capacity in the same sphere of work.

"The establishment in Canada of this Imperial school cannot fail to give a great stimulus to aviation in the Dominion, and may well lead to the establishment of an important Canadian industry. Young Canadians have in the present war shown just those capacities and qualities of daring which make the successful flying man. Sir David Henderson, the head and genius of the R.F.C., has testified to the excellence of the work of the Canadians in that Corps; they are, he declares, 'in every way a credit to the Dominion'; and official records have borne



KAMERAD!—The observer of a German aeroplane surrenders to the mitrailleuse of a French biplane. The pilot descended into the French lines. The genuineness of the photograph, which has suffered somewhat at the hands of the re-toucher, is vouched for by our French contemporary, "La Guerre Aérienne."

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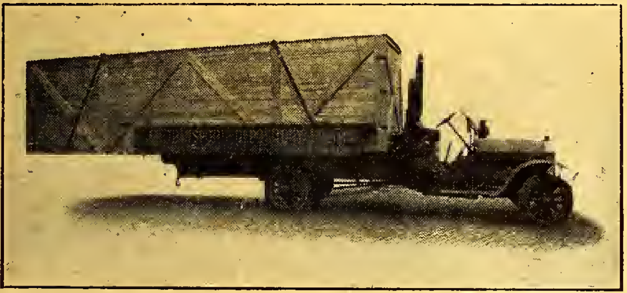

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similar witness from time to time. There is a large number of Canadians in the R.F.C. Canadians are also to be found in the R.N.A.S., and many of those known as British officers in both Services are of Canadian birth.

"Upon the development of this popular Service much of our future success on the Western and other fronts most certainly depends, and by instituting this Imperial Flying School in Canada the British Government gives a new encouragement to Canadian enlistment. The greatest advantage is anticipated from training in Canada, where the atmospheric conditions are well suited to the first stages of learning, and where, of course, there is illimitable space for developments which are less attainable in the more crowded centres of this country. The final stages of training will, of necessity, be reserved for this side of the Atlantic."

AUSTRALIA.

The seventh officers' course in aviation will be held at the central flying school, Laverton, from Feb. 1st to May 1st, 1917. Applicants must have volunteered for active service, and will be regarded as available for appointment to any unit of the A.I.F. on active service, and for embarkation at any time after the commencement of the course. Such officers may not qualify for pilots' certificates until they complete a course of instruction abroad.

* * *

The "Sun" of Nov. 5th reports that while flying in an aeroplane, which he built himself in Australia, Mr. Basil Watson made a "nose" dive of 2,000 ft. and looped the loop twice at Point Cook on Oct. 30th.

Mr. Watson, who is the son of Mr. J. I. Watson, of "Foilcleugh," Brighton, came to England about three years ago, and joined the Sopwith Company as a mechanic. He subsequently became a pilot, and was then engaged testing machines for the British Admiralty.

About three months ago Mr. Watson went back to Melbourne, and a fortnight later began to build an aeroplane at his father's home. The timbers used in the frame were Tasmanian bass and mountain ash. He made the propeller of Queensland walnut.

The machine is of the tractor biplane scout type, and was built on a general design from ideas which he gathered in England. Mr. Watson imported a French 50-h.p. rotary Gnome engine.

The biplane was conveyed to Point Cook, where the Flying School authorities had given permission for trials to be held. Mr. Watson gave the machine a short test, in which he found that it was capable of a speed of 80 miles an hour. He also found it to be very stable, and able to be flown for short distances with the hands off the controls.

On Oct. 30th Mr. Watson gave the aeroplane its first real trial. He remained in the air for 45 minutes, and gave spectators a magnificent exhibition of flying. After testing the capabilities of the machine Mr. Watson climbed to a height of 5,000 ft., and then turning head down, made a nose dive of 2,000 ft. Mr. Watson also made two perfect loops at a height of 3,000 ft. before descending.

TEXTILE ARMOUR.

On Jan. 17th a demonstration was held at the Café Monico of the Chemico Body Shield, at which a representative gathering of the Press witnessed practical experiments upon the bullet and bayonet-resisting properties of an invention which is being exploited by the County Chemical Co., Ltd., of Birmingham.

Mr. Wilfred Hill, J.P., gave a short lecture upon the problem which the designer of protective appliances against modern weapons had to face. He was emphatic in his statements that the firm did not claim to do the impossible, i.e., to armour a man from the penetrating powers of a high velocity rifle bullet, nor the pulverising qualities of an H.E. shell.

It had, however, been deemed possible to protect a man from bayonet thrusts, shrapnel balls, small shell splinters, hand-grenades, and revolver bullets, and a large measure of success had already been achieved in this direction, and many of the ten thousand soldiers now wearing the body shield on active service had spontaneously written to testify to the protection it had afforded them.

Mr. Hill stated that he and his colleague, Mr. Wilkes, had seriously considered the respective merits and demerits of metal and fabric armour, and, taking everything into consideration, were confident that the claims of the fabric variety were vastly superior to the metal. The chief difficulty with a metal shield was that it easily collapsed under sudden impact, and, owing to its rigidity, the shock conveyed to the body of the wearer, even when the missile failed to penetrate, was far greater than in the case of the fabric shield. Two other great objections had also to be faced. When penetration was effected the missile was almost bound to carry with it splinters of metal which entered the body and complicated the wound. Also, experience had shown that in certain cases men wearing metal protectors had been hit by bullets which failed to penetrate, but which ricochetted and killed someone else.

The Chemico fabric shield is composed of layers of specially chemically-treated textile material overlapping one another in echelon fashion. The principle was apparently inspired by the legendary Testament which so often stops bullets. The separate and loose layers present greater obstacles to a missile than one thick layer, as the bullet or whatnot has to worry its way through each successive layer, taking a small wad of the preceding layers with it, so its velocity is gradually checked, and motion is finally and completely arrested. The inventors claim, however, that when a bullet strikes the shield with sufficient velocity to penetrate completely, no fabric wad is taken into the body. The reason for this is not immediately apparent.

The proof of the pudding lies in the eating. Mr. Arthur Huckesteppe, of the Chemico Company, removed his coat and donned one of the shields to show how compactly it fitted the body, and how protection was afforded to the back and front of the complete thorax and abdomen. The back and front portions of the shield are joined together at the sides, where the thickness of the protective material diminishes considerably. This is a point which seems capable of improvement.

The actual tests were not, however, inflicted upon the *corpus* of Mr. Huckesteppe, as, although the Chemico shield will stop a revolver bullet at close quarters, the impact is likely to bruise the wearer considerably

Instead, a specimen shield was hung on to a sawdust sack, calculated to represent the consistency of a human trunk as nearly as possible, and Mr. Wilkes fired a number of shots at it from a distance of about 12 feet.

The weapon used was a long barrelled Colt revolver firing .45 ammunition. Owing to some misunderstanding with the Ministry of Munitions, it was not possible to use nickel-coated bullets, and the projectiles employed were plain lead round-nosed target bullets with brass caps fixed over the heads to prevent spreading.

Upon inspection of the shield all the bullets were found inside, and not one succeeded in piercing the shield completely.

To demonstrate the genuineness of the ammunition employed, the shield was placed in front of a metal drum and then fired at, and, although, as before, the bullet did not penetrate, its impact badly bruised the surface of the drum.

After this exhibition of ballistics, the shield was vigorously assailed by rifle and bayonet, but penetration was not effected, although several of the visitors did their best with this weapon.

It was stated at the demonstration that a shield had been placed in juxtaposition with a Mills hand-grenade, the explosion of which had failed to damage the shield seriously.

Mr. Hill stated that the question of employing the Chemico fabric for protecting the pilots of aeroplanes and the petrol tanks from machine-gun bullets and shell splinters was being investigated. The close quarters at which aeroplanes fight makes the need for the protection to be far greater than that afforded by the fabric employed for the protector as it is now made, but, as the weight problem is far less severe in the case of the aeroplane than in the case of the human frame, there seems to be distinct hopes that a good deal may be done in this direction.

The firm cordially invite inquiries from responsible persons who would care to assist in the investigation of the use of fabric protective shields on aircraft, both for war and peace purposes.—W. L. W.

INTEGRAL PROPELLER CO., LTD., versus BLIN DESBLEDS.

In the Westminster County Court, St. Martin's Lane, S.W., on Tuesday, Jan. 16th, 1917, before his Honour Judge Woodfall, the Integral Propeller Company, Ltd., sued Louis Blin Desbleds on a judgment summons.

Mr. Latey (Messrs. Cohen and Co.) appeared for the judgment creditors, the judgment debtor appeared in person, and the following dialogue took place:—

Mr. Latey: I appear, your Honour, for the judgment creditors in this case, and this is the second summons. Previously it came before your Honour in October, 1915.

His Honour: What was this for?

Mr. Latey: For the cost of a propeller for aircraft, made to the order of the defendant.

Mr. Desbleds: I am practically in the same position as when I came before.

His Honour: Why did you order the propeller?

Mr. Desbleds: It was done long before the war, for a little syndicate.

His Honour: Was it before the war?—Mr. Latey: Yes.

His Honour: How much have you made this last month?—Mr. Desbleds: My only pay is from the Polytechnic now, where I get about £4 or £5 a month.

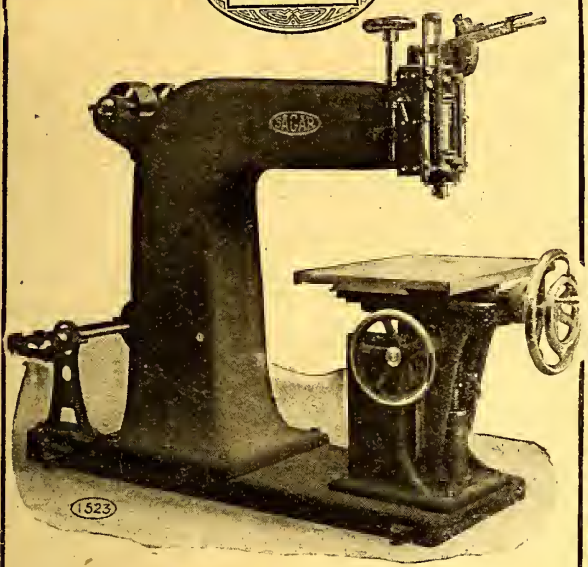
His Honour (to Mr. Latey): What do you know about him?

Mr. Latey: I should like to ask him a few questions, and I think I can satisfy your Honour that he is well able to pay. (To the judgment debtor): You are a consulting engineer?

Mr. Desbleds: I have given up my job as a consulting engineer.

Question: You now pose as a director, and you are a director and honorary secretary of the Aeronautical Institute of Great Britain?—Answer: Yes.

SAGAR



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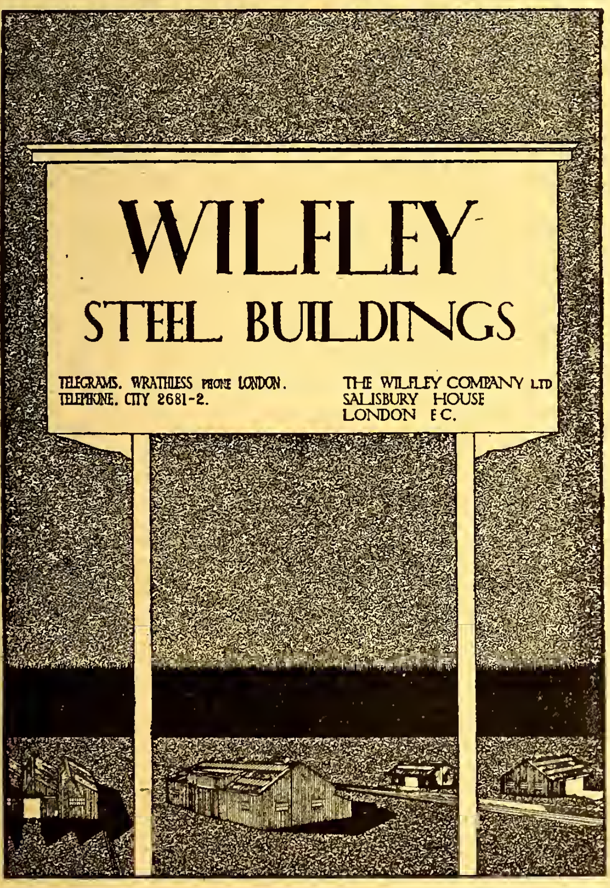

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Q.: What is the constitution of that Institute? Is it a partnership?—A.: No.

Q.: Is it a limited company?—A.: No; we are applying to the Board of Trade———

Q.: Are you responsible for it?—A.: I do not know.

Q.: The Institute occupies premises at Arlington Street?—A.: Yes.

Q.: What is the rental?—A.: £250.

Q.: There is a tenancy agreement?—A.: Yes.

Q.: Between whom?—A.: Between the Institute and the County Council.

Q.: Are you a party to that tenancy agreement?—A.: No.

Q.: Who guarantees the rent?—A.: There is no guarantee.

His Honour: Where do you live?—A.: In Horseferry Road.

Q.: At what rent?—A.: 9s. a week.

Mr. Latey: I believe you have a workshop a few doors away in Horseferry Road?—A.: No.

Q.: Have you at the Institute?—A.: No; it is nothing to do with me.

Q.: Do you devote the whole of your time to the purposes of the Institute?—A.: Most of my time—the majority of my time.

Q.: How do you spend the balance of your time?—A.: I give it up to my Polytechnic work.

Q.: Which is giving lectures at the Polytechnic?—A.: Yes.

Q.: How frequently?—A.: Two lectures a week on one evening.

Q.: How much exactly are you paid for that?—A.: A guinea per lecture, and there are about 30 lectures in the syllabus.

Q.: Are you the Examiner in Aeronautics for the Fellowship of the Society of Engineers?—A.: Yes.

Q.: What are you paid for that?—A.: Nothing.

Q.: You are director and honorary secretary of this Institute?—A.: Yes.

Q.: What are you paid as director?—A.: Nothing.

Q.: And as honorary secretary nothing?—A.: Yes.

Q.: You are editor of the journal "Air," the official organ——?—A.: Yes.

Q.: What are you paid for that?—A.: Nothing.

His Honour: Why do you do so much for nothing?—A.: Because I have been so much blackguarded in the Press that I have to do it to establish my position. There has been so much jealousy.

His Honour: I will make an order on the judgment of £2 a month.

Mr. Latey: Will not your Honour make a committal order?

His Honour: No. A man does not live in Horseferry Road at 9s. a week if he can pay £11. I shall make an order on the judgment of £2 a month, and then you can take out another judgment summons.

THE AERO COMMITTEE OF THE SOCIETY OF MOTOR MANUFACTURERS AND TRADERS, LTD.

The Society states that it has decided to form a fresh Aero Committee, and at a recent meeting of the Council representatives of the following members agreed to act:—

Arrol Johnston, Ltd.; Aster Engineering Co. (1913), Ltd.; British Thomson Houston Co., Ltd.; Brown Bros., Ltd.; Clement Talbot, Ltd.; Daimler Co., Ltd.; Dunlop Rubber Co., Ltd.; Green Engine Co., Ltd.; Humber, Ltd.; Lanchester Motor Co., Ltd.; Joseph Lucas, Ltd.; D. Napier and Son, Ltd.; Palmer Tyre, Ltd.; Simms Motor Units, Ltd.; Sunbeam Motor Car Co., Ltd.; Vauxhall Motors, Ltd.; Wolseley Motors, Ltd.

This Committee has power to add, and, doubtless, a number of other members interested will appoint, representatives.

The Society's circular states that the work of the former Aero Committee is best known to the public through the Aero Exhibitions held at Olympia, by which the aircraft productions of those times were first brought together in this country. The war, of course, has stopped such exhibitions, but many new problems have arisen, and are likely to arise, before exhibitions recommence. The Society is at present engaged, in conjunction with the Institution of Automobile Engineers and representatives of Government Departments and other bodies, on steel research of great interest to manufacturers of all high-speed internal combustion engines. The Under Secretary of State for War has referred to this in Parliament; a Treasury grant having been made after the Society had guaranteed a certain sum.

DISTINGUISHED VISITORS.

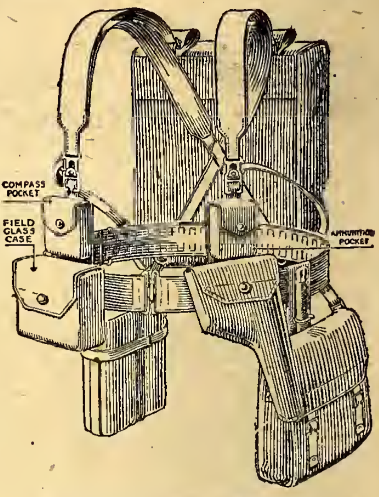
Viscount and Lady Bryce, who were in Leeds recently, took the opportunity of paying a visit to the Blackburn Aeroplane Co.'s works at Olympia. Lord Bryce was evidently greatly interested in all that he saw, and, in passing throught the various shops, frequently commented upon the many ways in which labour-saving machinery has been utilised by the firm.

He was highly interested in the propeller shop—incidentally Blackburn propellers are making quite a famous name for themselves—and he took particular notice of the land machine which is being built to the order of the Leeds Chamber of Commerce for presentation to the Government of India on behalf of the merchants and manufacturers of the City of Leeds.

WEB EQUIPMENT.

Messrs. Hazel and Co., of 4, Princes Street, Hanover Square, London, W., are the sole selling agents of a new web equipment for officers' field use, details of which are protected by patents.

The equipment has the appearance of the rank and file outfit at a short distance, but consists of articles specially designed for officers' use. It is intended to be worn on the field without the risk of attracting undue attention, but it may commend itself to ground officers in the Royal Flying Corps.



The "Hazel" Web Equipment.

The equipment comes apart with great ease, and the belt, single-brace and sword-frog, may be worn by themselves as a single-brace equipment.

Most patterns of officers' water-bottles and haversacks can be worn with the equipment provided they have swivels for attachment to the belt.

The set usually supplied consists of waist belt, braces, field-glass case and compass pocket, revolver holster and ammunition pouch, and bayonet-frog and knapsack, the cost of which is £2 3s. 6d. The additional attachments, such as water-bottles, and so forth, may be purchased at moderate prices.

A VITAL BRITISH INDUSTRY.

The perfection of the high-speed internal combustion engine, which began with the introduction of the motor-car 21 years ago, has re-modelled our methods of traction, and, at the same time, created a vast industry, with a large number of contributory trades more or less dependent on it.

Among the most important of these may be classed the manufacture of magnetos. But when war broke out there was only one British firm making magnetos, its output being under a hundred a week. Practically every magneto which went on to the motor vehicles, motor-boats and aircraft of Great Britain came from enemy Germany or from America. Till August, 1914, we had been content to go abroad for nearly all our magnetos.

But in a few short months British manufacturers got steadily to work. Some of the best scientific brains in this country were enlisted. New and special steels and other materials were evolved. To-day there are some 12 or more British firms making magnetos.

Their entire outputs, reaching a total to date of over 165,000 magnetos, have been made for war purposes, and are used on aeroplanes, seaplanes, airships, motor lorries, motor ambulances, motor-cycles, "tanks," big gun tractors, motor-boats, wireless sets, searchlight sets, lighting sets, etc., etc. In fact, it may be said that the war is being conducted on British-made magnetos.

After the war, the resources of the British magneto manufacturers will be at the disposal of the British public. There will be no need to buy enemy or other foreign magnetos.

A USEFUL CALENDAR.

The S.R.O. Ball Bearing Co., of 115, Southwark Street, S.E., have issued a calendar for 1917. This calendar is printed in good bold figures which can be seen across a large office, and contains space for memoranda which should be quite useful.

The S.R.O. Co. will be pleased to send copies to applicants from the trade while their supply lasts.

AVIATION FUTURE.

An Aircraft Manufacturer offers a prize of fifty guineas for the best article on "The Future of Aviation."

The article must be written with imagination, but at the same time well reasoned. It must be interesting and the language as non-technical as possible.

The article should be about 5,000 words in length. Closing date, Jan. 31, 1917. Address articles "Aviation, Willing & Co., Ltd., 50, Copthall Avenue, E.C."

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ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of THE AEROPLANE. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

J. S. D. (Clapham Common).—There are no civilian instruction schools for training for such posts in the Army as equipment officer. The civilian aviation schools are devoted entirely to instruction in flying and to matters relating directly to the care and upkeep of an aeroplane.

The instruction schools for equipment officers are purely military, and the only way to obtain appointment to such a school is to apply for a commission as equipment officer. It is useless to apply for such an appointment without technical qualifications.

Candidates accepted on probation are sent to one of these schools, where they are thoroughly coached in the duties of an equipment officer. These duties consist mostly in looking after the stores in an aeroplane Flight or Squadron, according to the grade of the equipment officer, and in seeing that damaged parts are returned in exchange for spares, and that the machines generally speaking are maintained in good condition in the field. Applications for appointment as equipment officer, and, in fact, for any appointment of commissioned rank in the R.F.C., should be addressed to the Department of Military Aeronautics, Adastral House, Victoria Embankment, E.C.

H. H. (Edinburgh).—The following letter is a sample of what one receives after all the information already given in these columns referring to joining the Services:—

> "I am anxious in having a commission, taking aviation as my profession, and to avoid the waiting list I intend to enter a private school for my certificate. (1) Would I therefore have long to wait for my commission after securing the certificate, and (2) failing my passing medical exam. could I obtain a post in some factory or school as a tester or instructor respectively? I have a fair knowledge of wireless."

As regards question (1), the only people who could give a reasonable reply to it would be the Directorate of Military Aeronautics, Adastral House, E.C., and even they could not give a definite reply, simply because the possession of a certificate is not even evidence that the holder is suitable for commissioned rank. As regards the second question, the possibility of obtaining a post in a factory or school depends entirely on the personal abilities of the aviator. He might be a first-class flier, and yet useless as a tester, and he might be a first-class tester and pilot and yet not possess a personality which would ensure anybody giving him a job.

D. C. (Kilburn).—You must have been misinformed as to the name of the book to which you refer, as the writer in question certainly never wrote a book entitled "Aircraft and its Construction," nor can one recollect any such book written by anyone else. Furthermore, there does not appear to be any book dealing with aircraft which contains any matter of any real value as far as woodwork and the covering of aeroplanes is concerned. One book which might be of interest to you as giving a general idea of construction and care of aeroplanes is "The Aeroplane Speaks": the Wm. Dawson Publishing Co., Rolls House, Breams Buildings, 6s., post free.

A. M. (Cambridge).—The only way you can obtain transfer to the R.F.C. Cadet Corps is to ask the assistance of the C.O. who is in charge of your infantry cadet battalion. There seems no reason why with his consent the transfer should not be made. It would probably be easier to obtain a transfer at the present time than to wait until you obtain an infantry commission, as once you are appointed to an infantry battalion it may not be possible to spare you for the Flying Corps.

F. J. H. (Porton).—Applications for appointment as Cadet must be made to the Department of Military Aeronautice, Adastral House, Victoria Embankment, London, E.C. In the case of enlisted men in the Army, previous permission must be obtained from the candidate's C.O., and the application must be forwarded through him.

H. W. (Luton).—The duties of an equipment officer, according to whether he is 1st, 2nd, or 3rd Class, range all the way from being the technical adviser to his Wing or Squadron down to being practically a commissioned officer store-keeper. In the higher grades he may be sending in highly technical reports to Headquarters at home on the behaviour of certain engines or the aero-dynamic qualities of certain types of machines, or he may be doing nothing better than checking the number of nuts and bolts in squadron stores, but a commission as Equipment Officer opens up quite large possibilities to a man who is a really clever engineer.

R. S. (R.N.V.R.).—You would probably find it more easy to transfer to the R.N.A.S. than the R.F.C., but this can only be done with the permission of your C.O. I do not think the expiry of your three years' contract with the R.N.V.R. would affect the position very much, as at any rate you will have to remain in the Service in one capacity or another until the end of the war. Your best course would be to ask permission to apply for a commission in the R.N.A.S., or alternatively in the R.N.V.R. as an observer.

I am afraid I do not know anything which may be communicated about the organisation of the Tanks. If it is possible for you to transfer to the Tanks I should think it would be equally easy for you to transfer to the R.N.A.S. or the R.F.C., in which case the matter of the Tanks does not seem to arise.

R. F. H. (Stonemarket).—It is quite impossible to tell you whether your application has been definitely turned down or not by the Admiralty without knowing the nature of the "stereotyped" reply which you received. As a rule the time during which applicants for commissions in the R.N.A.S. have to wait between their application for a commission and their interview with the Admiralty is not very long, but more likely applicants naturally get more rapid consideration than others.

J. R. H. (Mill Hill).—A youngster like yourself would do best by applying to one or other of the big aeroplane factories and asking for employment. If your people are prepared to pay a premium, you could, of course, be taken on as an apprentice. Otherwise you would have to content yourself with doing ordinary boy's work until you had given proof of your ability.

The only other alternative seems to be to go to the local Labour Exchange and ask to be enrolled as a munition learner. In that case, however, I expect you would have to accept whatever munitions job that was offered you.

J. P. D. (Carlisle).—I have no doubt that a practical watchmaker would be found suitable work in repairing instruments used by the R.N.A.S. The best way of ascertaining your position as regards the Military authorities is to inquire at the nearest Naval recruiting office, and also ask them whether you are entitled to a Naval armlet, until such a time as you are called up.

As you have doubtless been accepted in view of your trade as watch-maker, the test would probably be with similar work.

The principal instruments carried on aeroplanes and seaplanes are as follows: compass, aneroid barometer, clinometer, air-speed indicator, engine revolution counter, and oil and pressure gauge. I do not know of any book dealing with the construction of aeronautical instruments, but the construction of compasses and aneroids should be found in any book dealing with nautical instruments. I think you would get access to such a book from the principal library at Carlisle.

Men are accepted in the R.N.A.S. under various medical categories according to the work they are expected to do.

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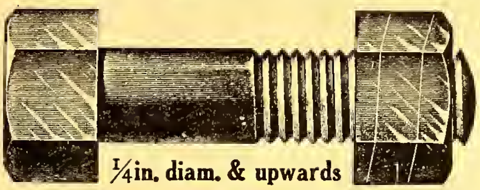

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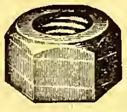

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Aeroplane Designer (Leeds).—Your communication does not make it quite clear whether your protest is against the Editor's advocacy of the abolition of drink or against the pictures from life of old-fashioned business firms, or against the increase of the supply of aircraft, in either of which cases protests hardly seem necessary. Please be more specific next time.

G. B. (Beeston).—Youths who wish to become pilots in the Royal Flying Corps must apply for appointment as Cadets with a view to being trained for commissions. It is quite hopeless to enlist in the R.F.C. at the present time with a view to becoming a pilot, as only a very few selected men ever get the opportunity. It is possible, however, that in the dim and distant future a great deal more will be done with enlisted men as aeroplane pilots.

G. E. T. T. (York).—It is quite impossible for a boy of 15 to get into either of the Flying Services. You will have to wait until you are seventeen at least, unless your physical development is precocious and you are prepared to tell lies about your age. Of course this method is very reprehensible and altogether a mistake, so you had better learn all you can in the meantime, and think about joining up when you are approaching 17 years of age.

T. C. J. (Chorlton-cum-Hardy).—Attested married men would probably be accepted for enlistment in the R.F.C. as oxy-acetylene welders. In making your application you should state that you are an expert in this particular branch of the work. It is rather difficult to get accepted for the R.F.C. locally, unless one of the R.F.C. recruiting parties happens to be in the city (Manchester). Your best plan would be to call at the central recruiting office at Manchester and inquire whether such a recruiting party happens to be in the vicinity. If not, you had better write to the R.F.C. Recruiting Depot, South Farnborough, Hants, and ask whether they will accept your services, and where they will require you to be examined. As an expert acetylene welder you are probably well employed where you are, if with a firm which is doing war work. Anyhow, plenty such men are needed in aircraft factories.

S. W. G. (Walthamstow).—The best way for you to prepare for a commission in the R.N.A.S. or the R.F.C. until you arrive at the eligible age of 18 is to read as many technical books as you can get hold of, and, if possible, spend some time in a workshop of some kind or another. A very good book to start with if you have no real notion of the elementary principles of flying is "The Aeroplane Speaks," by Capt. H. Barber, R.F.C., which lays out the whole question very clearly. The price of the book is 6s., post free, and this and all other technical aviation

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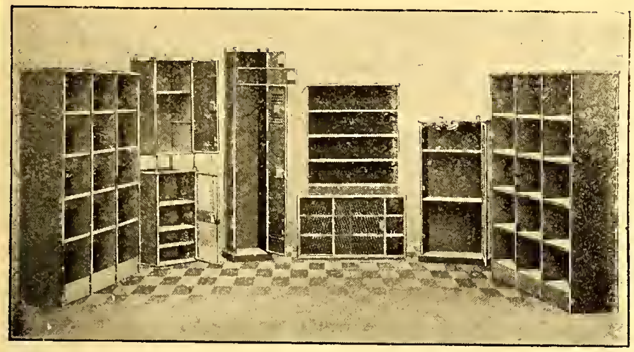

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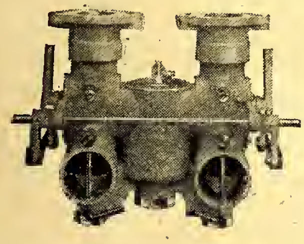

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E. S. P. (Watford).—B. and C. men only are accepted as Equipment Officers R.F.C., except where there are special qualifications, so there seems no reason why spectacles should be a bar. Probationers for commissions as Equipment Officers are sent to an R.F.C. instruction centre. A certain amount of technical knowledge is essential, but probably that possessed by you would suffice.

W. R. A. (Felixstowe).—Ratings in the R.N.A.S. who wish to transfer to the R.F.C. Cadet Corps must apply for permission to their own C.O., and the application must be forwarded to the Department of Military Aeronautics through official channels.

P. F. (Rochester).—The acknowledgment of your application for appointment as Probationary Flight Officer, R.N., and the return of your birth certificate, seems to indicate that the Admiralty will duly consider the matter. You may hear further in a week or two. If not, your best course will be to wait for two or three weeks, and then formally apply for further information. There is just the chance, however, that you may hear further from the Admiralty quite soon.

H. C. R. (West Cowes).—The leading American aeronautical papers are the "Aerial Age Weekly," subscription 5 dollars per annum, published by the "Aerial Age" Co., Inc., Foster Buildings, Madison Avenue, and 40th Street, New York City; "Aviation" (fortnightly), 1½ dollars per annum, published by the Gardner Moffat Co., Inc, 120, West 32nd Street, New York City, and "Aircraft," monthly, 3 dollars per annum, published by the Lawson Publishing Co., 37-39, East 28th Street, New York. Any or all of these publications can be ordered by the Wm. Dawson Publishing Co., Ltd., Rolls House, Breams Buildings, London, E.C., according to requirements. This will save the subscriber the trouble of dealing with foreign money orders. The rate of exchange may be regarded as 4s. 2d. to a dollar.

G. S. L. (Wellingborough).—The Armoured Car Support of the R.N.A.S. was disbanded long ago, so questions relating to commissions and enlistment therein do not arise.

W. M. S. (Aberdeen).—Full particulars regarding the pay and kit allowances of Probationary Flight Officers, R.N., and of Flight Sub-Lieutenants, R.N., may be obtained from the Air Department, the Admiralty, London, S.W.

A. B. G. (Silsden).—"The Flyer's Guide," by Major Gill, R.F.C., may be obtained for 4s. 6d. post free, from the Wm. Dawson Publishing Co., Ltd., 2, Breams Buildings, E.C., to whom all inquiries respecting technical books should be addressed.

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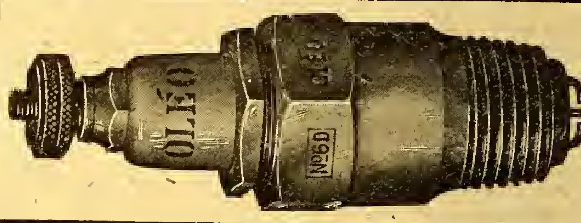

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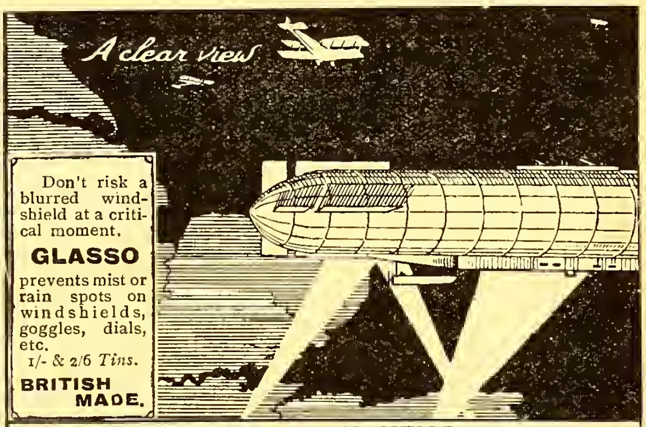

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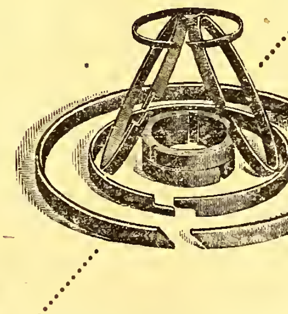

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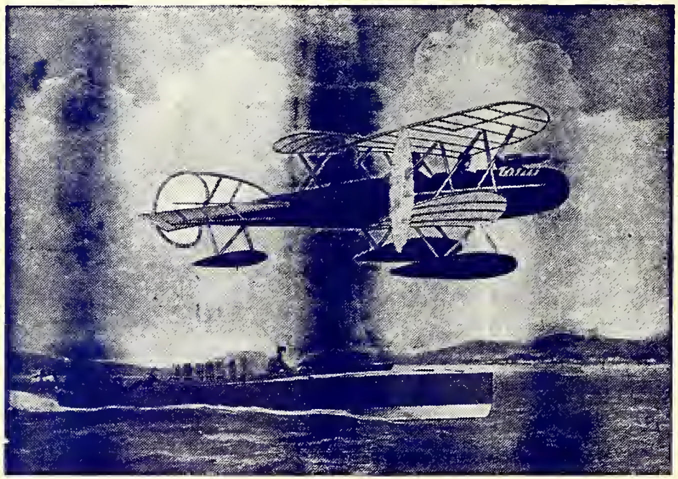

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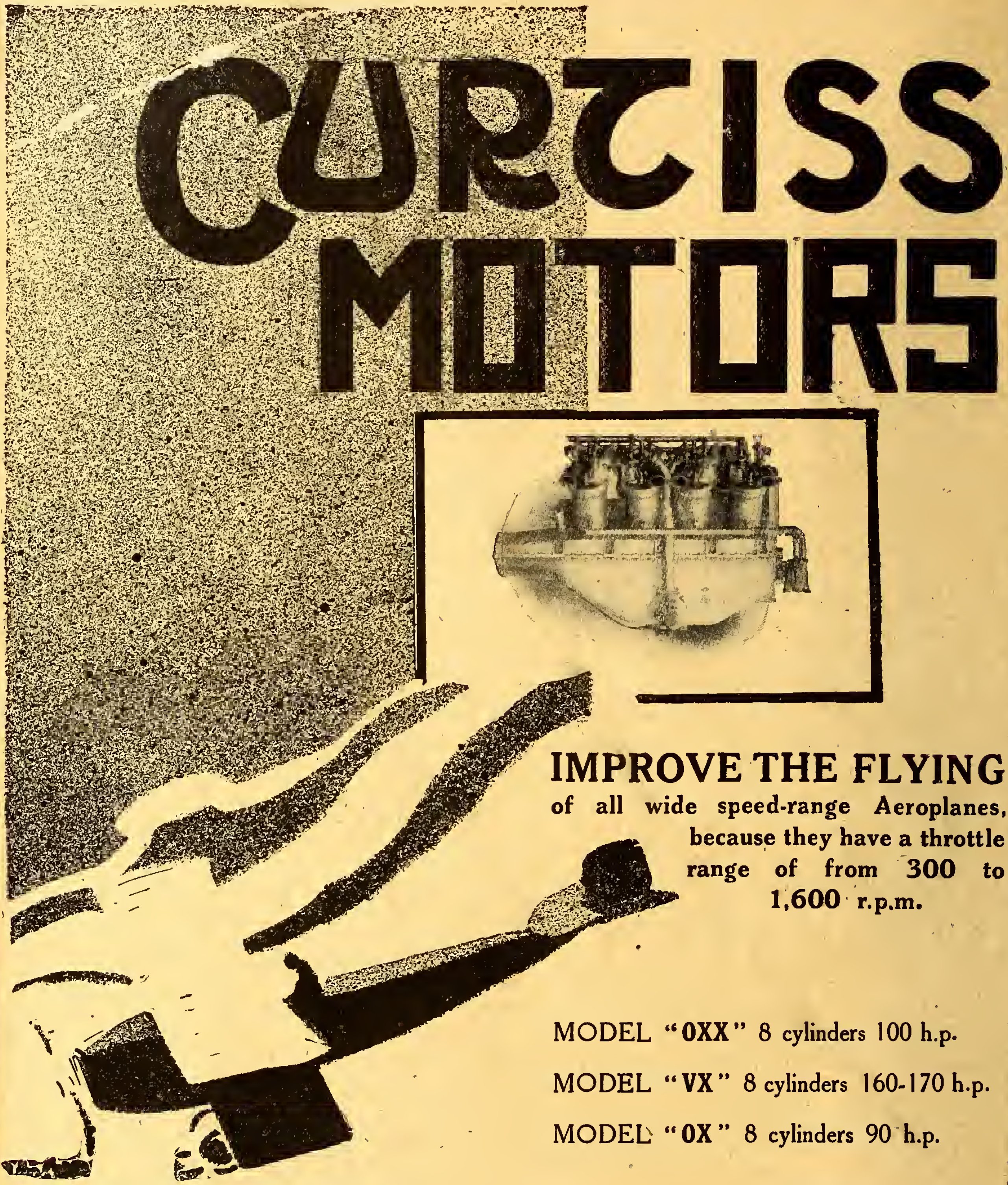

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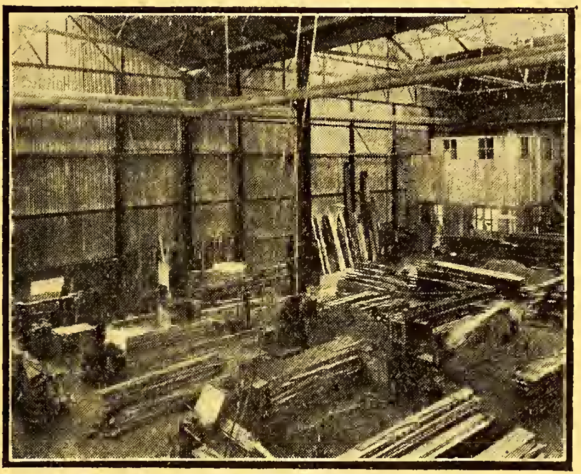

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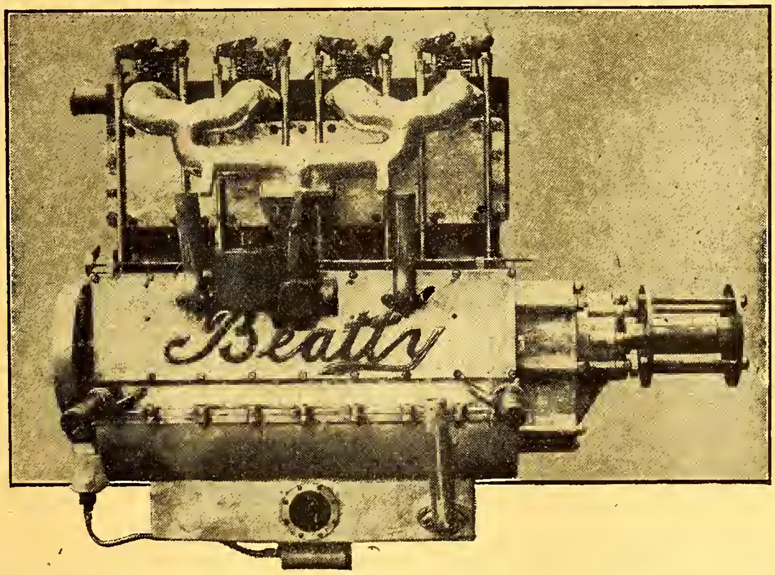

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ON THE ADDITIONAL RECOMMENDATIONS OF MR. BRIGHT.

As mentioned last week, following on the joint memoranda of Mr. Bright and Mr. Butcher appended to the Report of the R.F.C. Enquiry Committee, there is an Appendix containing certain recommendations by Mr. Bright alone.

Mr. Charles Bright is a distinguished engineer who, though he began to take a personal part in flying somewhat too late in life to become a pilot, has, nevertheless, acquired as a passenger a very sound, practical knowledge of flying, who has long been keenly interested in aeronautics, and who has devoted himself during the past year or more to the highly important subject of aeronautical engineering.

In the recommendations which follow hereafter, the logical engineering mind is apparent, whether Mr. Bright is dealing with purely educative flying and testing of aircraft, with such engineering matters as Inspection and Standardisation, or with strictly Service affairs such as Offensive Raids, or Essential Extensive Development of Air Service.

There may be points on which one disagrees with Mr. Bright, for even engineers may disagree as to the best method of building a bridge, and the best of engineers may make mistakes, *videlicet,* the girders of the great bridge at Quebec; but, at any rate, the engineering mind is logical in its constructive or critical methods, and mistakes are due rather to mistaken hypotheses or misstated syllogisms than to flaws in reasoning.

Consequently, Mr. Bright's conclusions, though of necessity stated without premises, are well worth serious discussion, excepting always those which are axiomatic and need no discussion, but merely appreciation.

Though these recommendations appeared over a month ago, it is even more important that they should be discussed to-day than when they appeared, for, what with the fall of the Government, the bursting of the old Air Board, the launching of the new Air Board, the construction of an embryo Air Ministry, the removal to the Hotel Cecil, the consequent upheavals at the Admiralty and the War Office, the falling out from metaphorical furniture-vans by the way—more or less like Joseph's Brethren *en route* for Egypt—the various intrigues and anxieties behind the new Air Board appointments, and so forth, plain constructive recommendations were rather apt to be lost.

To-day one can study them in an atmosphere of almost philosophic calm, for nothing very violent is likely to happen till the new Comptrollers of Air Supplies get fairly into their strides, and the discussion which accompanies Mr. Bright's recommendations (interpolated in brackets) is written in the hopes that it may be, if not of direct value, at any rate suggestive of ideas or of lines of thought or action to those concerned with the Flying Services, and with the Supply and Manufacture of Aircraft.

Let us therefore to the words of Mr. Bright:—

Preliminary Remarks.

Whilst some of the following recommendations may be considered rather outside the scope of our immediate terms of reference, it has seemed to me that a useful purpose might be served by presenting the conclusions arrived at after (1) a six months' complete concentration on the whole subject, (2) a previous study, covering several years, regarding special aspects, and (3) some little experience in the air.

Aerial warfare generally is now attracting a great deal of public interest—besides becoming every day of increasingly wide importance—and I here call attention to what, as the result of close investigation, strikes me more especially as points requiring consideration.

I should add that some of my recommendations, as set forth below, are only presented as objects to be aimed at as far as possible if and when circumstances permit; others have reference to what may already be to some extent the practice nominally—though not, perhaps, fully carried out at the present time.

(i.)—Civilian Training Schools.

Whilst I am satisfied that the attention to Civilian Training Schools has been considerable, it appears to me that in days to come all possible encouragement should be accorded to civilian pilots on a really lasting basis, and that an extended study might suitably be made of the future development of civilian schools for war equipment purposes.

[The work of Civilian Schools, over and above their present highly successful efforts under military control, pertain to the future days of peace in preparation for the next war. Mr. Bright's remarks seem to suggest primarily that Civilian Schools should be subsidised, and, as a natural consequence, kept under military supervision, or, at any rate, under inspection. From this would follow the enrolment of civilian aviators in the R.F.C. Special Reserve, as was done before the war.

It would be worth while to consider the organisation of such civilian aviators on a Territorial basis, somewhat in the manner suggested by Mr. (now Captain) W. E. de B. Whittaker, a year or so before this war. It is not unlikely that civilian flying for sport will be carried on after the war, on a co-operative principle, by means of Flying Clubs. Possibly, also, Flying Clubs will be conducted either by existing schools or by the big aircraft manufacturers, so that a man who can now afford to hunt can then afford to fly. Such clubs, when they come into being, should also receive encouragement, and, if necessary, direct assistance from the Military Authorities.

It is to be hoped that Universal Service will continue after peace returns, and those who wish to do so should be encouraged to put in their term of service in the R.F.C. In this way young mechanics from the flying schools and from the factories, as well as school instructors, test pilots, and amateur aviators, may all be used to advantage.]

(ii.)—Advice from Active Service Pilots.

I am of opinion that Squadron Commanders and active service Pilots of considerable experience at the front might be more taken into consultation, in an official way, regarding machines and engines.

An additional advantage would be gained here in the event of a second misfortune with a given machine—whether with the same pilot or otherwise in view of the fact that there is always a chance of the blame being thrown on the engine or machine, where it should not be.

It might be arranged that on the occasion of an officer returning from the front, he should hand in any suggestions arising from his experiences to the Aircraft Committee proposed in Recommendation xv.

[It is gratifying to find that, after all the experience derived from his work on the Enquiry Committee, Mr. Bright's views agree so closely with those so often expressed in this paper on the proper method of using the knowledge gained by active service pilots. Five minutes' conversation with a pilot just back from the front would teach the Headquarters Staff at Home more about the latest developments of aerial warfare than would many sheets of official reports.

One recognises the difficulties likely to arise from thus "short-circuiting" information and opinions by direct interview between junior flying officers or N.C.O. pilots and the Staff at Home; but if an officer of the right type were specially appointed for the purpose, perhaps it could be done without subverting discipline. Such an officer would need to be of sympathetic nature, of mild aspect, and of not too high a rank, so as to avoid intimidating junior pilots into dumbness, or into a state of mind wherein they would be afraid to give vent to criticism or air their opinions about their equipment.

Written reports should certainly reach the Aircraft Committee (suggested later on), or whatever body does the same work, but they might equally well come from the front itself without waiting till the writer comes home. It would probably be necessary to institute a regular "suggestion" system, similar to that now existing in many engineering shops—chiefly in America—by which suggestions would go from the junior ranks to the higher authorities at home through the usual channels of Flight and Squadron Commanders, but without the higher ranks having the power to stop them or appropriate the credit themselves—in the manner prevalent in many English engineering concerns.

The whole question of uncensored communication between the actual users of aircraft and the Directors of Air Organisation and/or of Aircraft Supplies needs very careful consideration, so that all credit-snatching, axe-grinding, and general intriguing may be avoided in order that the active service pilots may always have the best possible aircraft existing at any given moment.]

(iii.)—Inventions.

Every possible encouragement should, I think, be given to any new practical inventions in the field of military aviation; and, in the case of one that seems really likely to prove of material value if developed, suitable financial aid should, where desirable, be granted for that purpose by the Government.

If a public research laboratory were established—either by the State or by private enterprise—a considerable impetus to invention should accrue, especially if official aid were available. M. Eiffel's Laboratory in Paris, which answers to this description, has proved its public utility.

[This recommendation might seem a platitude to anyone who did not know something of official methods. After what one knows of the genesis of the "Tanks"; after the allegations made by Sir Theodore Cook, of the *Field* newspaper; after sundry curious stories current about the "adoption" of some engine designs, the refusal to permit the construction of others, and the refusal to give others a proper trial; and after the hanging up for months of decisions regarding new and improved aeroplanes, one recognises the need for recommending "every possible encouragement" for "new practical inventions," and for the establishment of a "*public* research laboratory."

Mr. Bright might, perhaps, have added that the chief obstacle to the adoption of new practical inventions is the fact that in both Services, and in all their branches, the official who has to decide whether a new invention is worth having for any purpose is generally the very official whose duty it is to invent weapons or mechanisms for that purpose. That system means that, before an inventor can get his invention adopted, he has to convince an official rival that his idea is better than the official idea, "which is absurd, Q.E.D."—as Euclid says.

It is naturally difficult to prevent an official—in uniform or out—whose duty it is to judge rival makes of, say, aero-engines from developing ideas of his own on the subject, and consistent study of other people's designs may suggest to him ideas for improvements which are worth trial. But it is perfectly easy to insist that any reasonable idea from outside shall have a fair trial, and that the aforesaid official shall be powerless to "crab" an outside idea without trial, as happens on occasion.

A public laboratory, including, if necessary, an aerodrome, test aeroplanes, and pilots, all complete, would remove many of these difficulties if placed under proper management, and kept rigorously free from undue influence from other departments.]

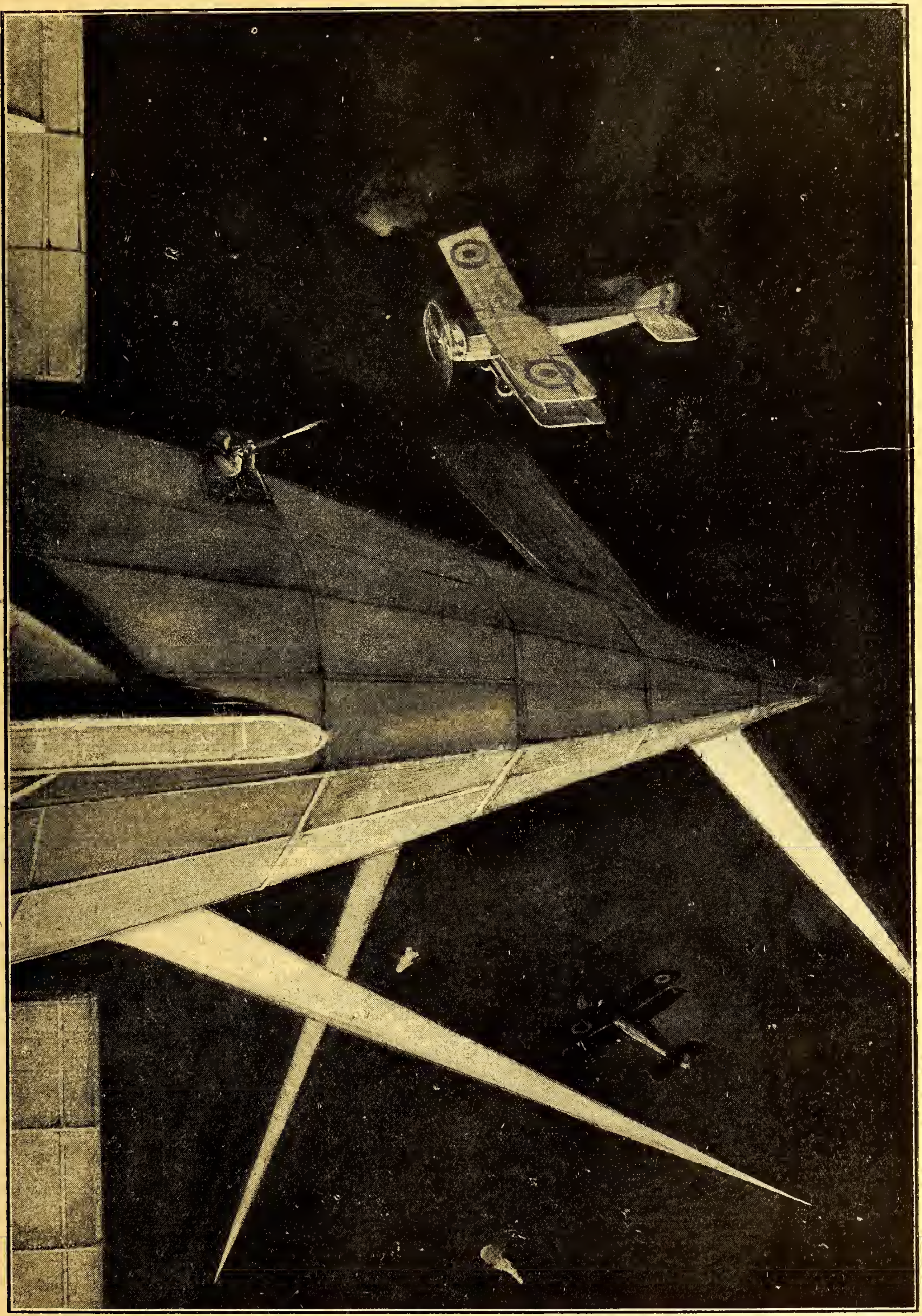
(iv.)—Inspectors.

I am strongly of opinion that, in view of the extreme importance of highly efficient inspection of war aircraft and aero-engines, steps should be taken—at any rate, as soon as the war pressure passes off—to introduce into the Aeronautical Inspection Department (A.I.D.) more who have had a training that would especially fit them for the work in a technical sense, including a substantial knowledge of the materials involved. With this object in view, I would, indeed, urge that application might be suitably made to such recognised organisations as the Institution of Civil Engineers and the Institution of Mechanical Engineers, who would, no doubt, be able to recommend suitable engineers. This want of trained men, in my opinion, applies—

(*a*) To the department considering proposed designs;
(*b*) To that inspecting the designs when carried out;
(*c*) To service at the front for reporting on the performance of new machines in active service.

No doubt the present arrangement quite suitably applies to many of the supernumeraries, but not, I think, to those carrying out the more responsible work.

The salary offered to inspectors and viewers does not strike me as being likely to attract the sort of man that—from a technical and moral standpoint—is really required; and I am not altogether surprised to find, in the circumstances, that a certain degree of laxity has



Painted by Geoffrey H. Watson.

A REARGUARD ACTION.—An idea of the lonely little man on the extremity of a Zeppelin's tail when attacked by aeroplanes.

prevailed at one time or another in this department, more especially in regard to the working hours and working arrangements generally. I consider that the wages at present paid to these officials bear an unsuitable relation to those making the machines and engines.

[In this recommendation Mr. Bright opens up an enormous subject, on which one can only touch very briefly. Practically the whole trouble arises from the matter of pay. The man who is fit to be a senior inspector of the calibre actually necessary for such work is a man who could earn between £500 and £1,000 a year as a works manager. Therefore it is fairly obvious that the right kind of man cannot be got for £300 a year or less.

The origin of the trouble is the idea that an officer in the Army is a gentleman of independent means, who takes to soldiering as a hobby, and to whom pay is merely a side issue. The pay of Army officers being based on this idea, it follows that a mere civilian inspector, or an inspector dressed in uniform for the duration of the war, cannot be paid at the rate of a Colonel while ranking merely as a Captain.

Moreover, most men of the necessary calibre would prefer a job with a manufacturing concern where they would have a sporting chance of rising to still higher places as Managing Directors at salaries running into thousands per annum, so that the strict limitations of Service prospects can have no charm for them. The problem is almost unsolvable unless the R.F.C. can obtain control of its own corner of the Treasury, and run an R.F.C. Pay Department distinct from the Army Pay Department. Possibly this is the way out, for already the Subaltern Flying Officer is regarded as being worth about three times as much as the Subaltern of the Line, and a similar system of assessment may be extended to the technical departments.

One is in doubt as to whether the Institutions of Civil Engineers and of Mechanical Engineers could supply men of the quality required, for aeronautical engineering has developed a science and practice of its own, as yet unknown to the older species of engineers, but the right type of man might be found in aircraft factories, and commandeered thence by arrangement with the Society of British Aircraft Constructors, on a system of "combing out" and "substitution."

Much the same arguments apply to examiners and viewers. No trustworthy man will take a viewer's job at a couple of pounds a week when he might be earning three or four pounds on a lathe or at the bench. Consequently as mentioned in this paper some months ago, we find the work of first-class factory operatives being judged, and condemned, by men who are vastly their inferiors in skill and knowledge. This has grievous effects on the *moral* of the workmen, it kills their enthusiasm, and prevents them from doing their best to win the war.]

(v.)—Dating Inspection Stamps.

Arising out of certain evidence, I recommend that all inspection stampings should, in future, be dated. This plan would greatly help towards placing responsibility in the case of any mishap due to faulty construction, faulty repair, or faulty inspection at any of its various stages.

[This is apparently a difficult condition to fulfil, especially where metal stamps are concerned. The subject suggests another—namely, insistence on the proper use of stamps bearing the identification number of the viewer or examiner. I have heard of defective metal fittings going through, bearing the A.I.D. stamp, but with the stamp skilfully applied, so that the identification number had "slipped over the edge" and did not appear.

Such an incident immediately suggests that the viewer had been bribed to pass defective stuff, and avoided identification in the manner indicated. Which brings one back to the extravagance, if not the criminality, of putting underpaid men into responsible positions.]

(vi.)—Standardisation.

Having regard to the rapid aerial developments as an outcome of war experience, I do not consider that anything in the nature of close standardisation—brought to so high a pitch in almost every direction in the United States—could be suitably applied to aviation in its present stage, though it is highly likely that more might be done in standardising certain parts such as are common to all machines.

On the other hand—in view of the conflicting requirements of machines for different work—I would strongly urge the desirability of more definitely designing machines for specific purposes. For example, in my opinion, a long-range reconnaissance machine should be designed almost solely from that standpoint and without regard to any conflicting requirements. Again, a long-range "bomber"—a more recently considered requirement—should be made a separate and special study of.

In the early days of the war, when aeroplanes were solely regarded as reconnaissance machines, it was but natural and proper, as soon as their fighting properties began to be considered, that—partly in view of the shortage of men and material—the same machine should be turned to several different accounts and produced on that basis. It stands to reason, however, that a combination machine of this description can never be as efficient in any one direction as a machine especially designed to do specific work.

Whilst, in my opinion, the time is not ripe for any material standardisation of the types of machines, engines, etc., I feel strongly that some sort of standardisation is highly desirable in connection with much of the data put forward regarding the material used. For instance, there should be some definite standard time in air on which to base the weight per horse-power. At present the amount of petrol allowed is sometimes based on a 1 hour's flight, and sometimes on 6 hours', etc.

I also consider that other standards should be adopted in the case of trials.

Again, in a number of instances the statistics at present provided about different machines and engines strike me as quite inadequately comparable.

It appears, indeed, at present—for want of standardisation—to be impossible to secure really comparable data (under the same conditions and with conditions exactly stated) for the trials of different machines and engines.

Similarly, a definite understanding ought, in my opinion, to be come to—between the Aeronautical Directorate and all those designing and supplying engines—regarding the statement of horse-power, in such a way that the horse-power of all engines is either correctly stated or uniformly understated.

[Here, again, Mr. Bright has brought forward a very pressing question, and one upon which one can only barely touch in this discussion.

As regards standardisation of detail parts and fittings, it is possible to standardise in aircraft more easily than in any other industry, simply because the whole thing is so young. And the first recommendation I personally should make is that the metric system be adopted throughout.

The prize example of confusion is, of course, the famous R.A.F. drawing of a crankshaft in which dimensions were shown haphazard in millimetres, decimals of inches, and fractions of inches. But even the best of firms talk engine bore and stroke in millimetres and all other dimensions in

. The .

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inches. Tubes may be either millimetres or inches. Thicknesses of tubes or sheet metal may be given in gauges or in decimals of millimetres, or in decimals of inches. Wires likewise may be in either measure.

All this ought to be reduced down to metric standard, and metric threads should be adopted also. Then we should be in complete accord with our Allies, not to mention the enemy, which would not only facilitate interchange of material during the war, but would vastly aid commercial transactions after the war. A brief joint conference between the Controller of Aeronautical Supplies at the Ministry of Munitions, the Director of Aircraft Supplies, R.F.C., with their staffs, and representatives of the Society of British Aircraft Constructors could settle the whole question.

As to what parts of aircraft could be standardised, that is another and much larger question, which must be handled at length at a later date.

The suggested adoption of a standard of fuel capacity for purposes of comparing weights of power-plant is worth considering, so long as it is understood that it is purely for comparative purposes. But it must always be remembered, as Mr. Granville Bradshaw pointed out in this paper some weeks ago, that a light engine which is extravagant in fuel may under certain very important conditions score heavily over a heavy but economical engine, in that after a certain time in the air the whole power-plant becomes so much lighter. And for short flights, such as on a couple of hours' fighting patrol, the light engine scores all the while.

The standard measurement of horse-power recommended by Mr. Bright is certainly highly desirable. The only way of obtaining it seems to be by the use of a standard brake-test. Calculated or nominal horse-power is worse than useless, as it merely deceives the unfortunate designer.]

(vii.)—Standard Heights for Speed and Climb and Standard Time for Climb.

I would strongly urge that, for purposes of proper comparison, standard heights should be adopted both for speed and climb as well as a standard (unit) time for climb.

At present there appears to be no common rule in the matter, some private firms expressing the performances of their machines and engines in one term and others in another.

I suggest that the speed specified should be (*a*) that practically at ground level—as is customary; and also at (*b*) the fairly average working height of 10,000 feet (or 5,000 feet), where it may be something between 5 and 10 m.p.h. less.

Similarly, in the matter of climb this should be expressed (*a*) in miles per hour at a height of 10,000 feet; or, if the machine is not capable of reaching that height, then the rate of climb in m.p.h. should be stated for whatever the maximum height is. Further (*b*), a statement should be given as to the length of time taken to reach the 10,000 feet, or whatever is the maximum height attained.

[This is another very sound recommendation. One would suggest, however, that the speed test at ground level, or near it, be abolished, simply because it gives no idea of a machine's maximum speed at the particular height at which it flies at its best angle—or Optimum Angle of Incidence, as Captain Barber calls it in his lucid dissertation on the subject.

A test at 10,000 feet is a desirable standard, as that represents a useful working height for most machines; but there should be a standard method of making the test, with measurements from the ground, for it is not quite clear whether air-speed indicators of the Pitot Tube type give absolute accuracy when high up, and, anyhow, a Pitot Tube can so easily register wrongly if placed in certain positions on the machine.

The height-speed test might be omitted in the case of machines, which *may* come into use, intended to give phenomenal speeds at low altitudes—for instance, armoured machines for photographic work at close quarters. One recalls the German "Copper-Belly" in this connection.

There should also be a definite standard "roof" for all war machines—the roof being the R.F.C. colloquialism for the height at which an aeroplane refuses to climb any farther, a phrase derived from the idea of a fly up against a glass roof and unable to get any higher.

At present a French aviator generally knows off-hand the time his machine takes to reach 1,000 metres, 2,000 metres, and 3,000 metres. These heights might conveniently be adopted as standards for comparison.

If, as Mr. Bright suggests, a machine cannot reach 10,000 feet, it should be condemned and deleted—always excepting the "Copper-Belly" type—and it would not be worth while to measure its climbing rate, time being valuable in war.]

(viii.)—Nomenclature.

I cannot help thinking that steps might suitably be taken to adopt a system of nomenclature that would indicate the engine and horse-power that is combined with the machine itself; so that when, say, the B.E.2c is referred to it is not necessary to investigate with what engine she is fitted in that particular instance.

Certainly, so far as concerns R.A.F. designs, the present more or less haphazard and confusing system of nomenclature ought to be capable of improvement in the way of a consistent plan.

Again, some general agreement should, in my opinion, be arrived at as to the description of different machines relative to their purpose. The most striking example of the need for attention here is the so-called "Scout." That term is only at all generally applied now to a "single-seater," comparatively small, agile machine; yet no single-seater is suitable for "scouting," if that term is taken to mean reconnaissance such as involves the services of two officers. On the contrary, machines that are going by the name "Scout" are mainly "fighters"—offensive and defensive—and machines used as guards.

I urge this point—as well as those immediately preceding—whilst the development of Military aviation is still in its comparative infancy; for, in my opinion, anything like haphazard nomenclature or standardisation should not proceed further, lest it some day lead to serious misapprehension of one kind or another.

[Certainly the naming of aeroplanes is confusing. B.E., originally Bleriot Experimental, now supposed to mean British Experimental, and once jestingly described as the Beast Extraordinary, really means nothing, for it has ceased to be an experiment, and is merely a back number. R.E., once fondly imagined as Reconnaissance Experimental, would be better lettered W.D., or Wireless Dud. S.E., erstwhile Scout Experimental, familiarly Suicide's End, or Simply 'Ell, is certainly not a scouting machine in its latest, and, one hears, rather successful, development, though it might stand for Strafer English. F.E., at first Farman Experimental, and later Fighting Experimental, became for a while Fokker Exterminator, but now it is more like Fritz's Easy, when up against the new Albatros and Fokker and Halberstadt. So what can one do for one, as it were?

Fighting machines may be tractors or pushers, with one, two, or three, or more seats, and one, two, or three, or four engines. So may bombing machines. A strategic scout, which we shall need when "tanks" produce

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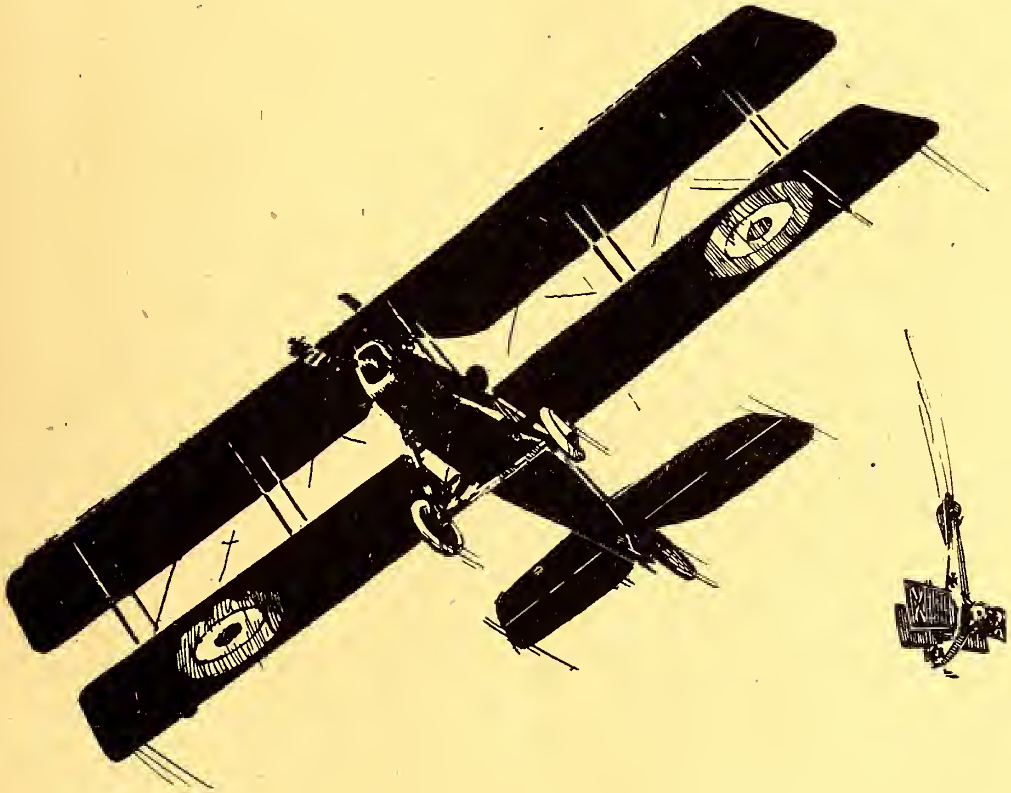
A BRITISH PILOT AND A—



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mobile fighting, would properly be a 150-mile-an-hour single-seater, but a tactical scout might be a mere 100-mile-an-hour two-seater. So evidently we cannot nomenclate according to the purposes for which a machine is intended.

Also, machines may be built for one job and used for another, just as the Martinsyde bomber was used as a fighter by the R.F.C. and the Sopwith fighter was used as a bomber by the R.N.A.S.

Short of describing a machine fully, as, for instance, "a three-engined, twin-fuselage, fighting bomber," there seems no alternative but to call the same thing a Caproni, and let it go at that, because people in the Services know that a Caproni is that kind of animal. The uninitiated must simply buy or borrow a copy of "All the World's Aircraft" and look it up.

At the same time there was no sense in calling a fighting machine a Bristol Scout, when the nickname, the Bristol Bullet, fitted it so much better. The one machine whose function was never in doubt was the Vickers Gun-'bus. And, as a rule, the nicknames creep into official documents before very long, because, if a nickname sticks, it shows it is right.—C. G. G.

(To be continued.)

THE SOCIETY OF BRITISH AIRCRAFT CONSTRUCTORS AND THE FUNDS FOR THE FLYING SERVICES.

In November last the Committee of Management of the Society of British Aircraft Constructors made an appeal for donations to the Winter Comforts Funds of the Royal Naval Air Service and Royal Flying Corps, which provide comforts for men at the front and prisoners of war belonging to the British Flying Services. The Royal Naval Air Service Comforts Fund is under the care of Mrs. Murray Sueter, and Lady Henderson is the president of the Royal Flying Corps Aid Committee.

In response to this appeal a total sum of £6,785 has been received, and the following is a complete list of subscribers:—

Aircraft Manufacturing Co., Ltd., W. H. Allen, Son & Co., Ltd., Austin Motor Co., Ltd., Beardmore Aero Engine, Ltd., Boulton & Paul, Ltd., British & Colonial Aeroplane Co., Ltd., Crossley Motors, Ltd., Gnome & Le Rhone Engine Co., Gwynnes, Ltd., D. Napier & Son, Ltd., Handley Page, Ltd., Parnall & Sons, A. V. Roe & Co., Ltd., Short Bros., Siddeley-Deasy Motor Car Co., Ltd., Sopwith Aviation Co., Ltd., Sunbeam Motor Car Co., Ltd., Vickers, Ltd., Whitehead Aircraft, Ltd., and Wolseley Motors, Ltd., £210 each.

Accles & Pollock, Ltd., Coventry Ordnance Works, Ltd., Darracq Motor Engineering Co., Ltd., Dudbridge Iron Works, Ltd., Engineering Timber Co., Ltd., Grahame-White Aviation Co., Ltd., Kayser, Ellison & Co., Ltd., Martinsyde, Ltd., Robey & Co., Ltd., Gordon Watney & Co., Ltd., and Westland Aircraft Works (Petters, Ltd.), £105 each

G. & J. Weir, Ltd., £100.

Benton & Stone, Ltd., Blackburn Aeroplane & Motor Co., Ltd., Bullivant & Co., Ltd., Cellon, Ltd., Thomas Firth & Sons, Ltd., Hooper & Co., Ltd., Mann Egerton & Co., Ltd., G. D. Peters & Co., Ltd., S. E. Saunders, Ltd., Waring & Gillow, Ltd., and Wells Aviation Co., Ltd., £52 10s. each.

Brazil, Straker & Co., Ltd., Wm. Jessop & Sons, Ltd., and Alexr. Stephen & Sons, Ltd., £50 each.

J. Glikstein & Son, Ltd., Fredk. Sage & Co., Ltd., and Willans & Robinson, Ltd., £26 5s. each.

Alfred Herbert, Ltd., Wm. Mills, Ltd., and Fredk. Mountford, Ltd., £25 each.

Robinson, David and Co., Ltd., and Skefko Ball-bearing Co., Ltd., £21 each.

Thomas Smith's Stamping Works, Ltd., and Wylie & Lochhead, Ltd., £20 each.

Albion Drop Forgings Co., Ltd., J. Beardshaw & Son, Ltd., Clarke, Cluley & Co., Coventry Swaging Co., Ltd., Fellows Magneto Co., Ltd., Gardiner, Sons & Co., Ltd., Gloucestershire Aircraft Co., Integral Propeller Co., Ltd., John Lysaght, Ltd., Mendine Co., Nettlefold & Sons, Ltd., Park Royal Engineering Works, Ltd., Pulvo Co., Ltd., Charles Richards & Sons, Ltd., Rotherham & Sons, Ltd., Rubery, Owen & Co., S. Smith & Sons, Ltd., Tubbs, Lewis & Co., Whiteman & Moss, Ltd., Woodside Engineering Co., Ltd., and Yorkshire Engineering Supplies, Ltd., £10 10s. each.

Major J. G. Weir, £10.

Edgar Allen & Co., Ltd., Bowden Wire, Ltd., Fox, Elliott & Co., Ltd., John Garrington & Sons, Ltd., Thos. J. Gardner, Godley & Goulding, Ernest H. Hill, Ltd., Henry Hughes & Son, Ltd., Arthur Lee & Sons, Ltd., Llewellin & James, Ltd., Wm. Moss, J. Payen, Sanderson Bros. & Newbould, Ltd., Short & Mason, Ltd., H. C. Slingsby, Stephenson & Sons, Ltd., Swift Levick & Sons, G. P. Wall, and F. Westbury & Son, £5 5s. each.

Morris & Co. (Decorators), Ltd., Moss Gear Co., Ltd., and Oliver Arc Lamp, Ltd., £5 each.

The Civil, Nautical & Mechanical Engineering Co., Ltd., and George Spicer, £3 3s. each.

James Clews & Sons, Ltd., Wm. Kenyon & Sons, Ltd., Midland Presswork Co., Omnium Central, David Petrie, and Stokes & Holt, Ltd., £2 2s. each.

Grace and Marsh and M. Mole & Son, £1 1s. each.

J. G. Ingram & Son, 10s.

TOTAL, £6,785

Of the foregoing sum £853 2s. 6d. was earmarked in favour of the Royal Flying Corps Fund and £275 12s. 6d. in favour of the Royal Naval Air Service Fund.

Enquiries were made as to the proportion in which the total sum received should be divided between the two funds, and, having regard to all the circumstances, the Committee of Management have distributed the money as follows:—

To Lady Henderson, for the R.F.C. Aid Committee	£4,680
To Mrs. Murray Sueter, for the R.N.A.S. Comforts Fund	2,105
	£6,785

Lady Henderson writes that the amount subscribed by the Industry has made all the difference to her work, and that it has enabled her to carry out many large requisitions from the Front, and Mrs. Sueter also expresses her thanks to all the donors, and says that the amount will enable her largely to run the R.N.A.S. Fund through the winter.

The Committee of Management desire to add their own thanks for the ready and generous response to their appeal.

One can honestly congratulate the once-despised "Trade" on having behaved handsomely in this matter, and one hopes that next winter, when the Flying Services will be so much bigger, in preparation for the 1918 campaign, the Aircraft Industry will contribute proportionately to the comforts of the men of the Services.

LIGHTS UP, PLEASE.

Mr. Ingleby Oddie, the Lambeth Coroner, at an inquest last week on a man who was killed by an R.F.C. car on Sunday evening, said that he began to wonder whether the lighting regulations had not been carried too far. Everyone would appreciate the necessity of darkening our streets at times when raids were likely, but he had never heard of Zeppelins arriving at five, six, seven, eight, or even nine o'clock in the evening.

People leaving work and returning home had to catch their trams and 'buses or walk about at a time when the streets were extraordinarily dangerous, and he began to wonder whether the time had not come when the lights should be turned up, at any rate, until 9.30.

People who made the regulations, perhaps, did not usually travel by trams and 'buses, and so did not realise what a terrible state of things existed in London just now in "crush hours" at night.

He had been looking up the statistics of fatal accidents due to the darkened streets in his own district, and the result was very striking. In October, November, and December, 1913, there were 17 inquests on street accidents. In the same months in 1916 there were 47. There were eight London Coroners, and, if these figures were so multiplied, it would be found that a terrible state of affairs existed during the hours of darkness, and he earnestly hoped that the authorities would take the matter seriously into consideration.

[And quite time, too. As this paper has constantly said, ever since this ridiculous darkening order came into force, it is impossible to hide London, and the only thing that can be done with advantage is to arrange confusing lights. There are many ways in which this can be done, while allowing fully adequate lighting in the streets.

As a matter of fact, the only time when London is decently lighted is when a raid is in progress and the searchlights are in full blast.

Recently the famous French pilot, Louis Noël, when visiting London, stepping out into the dark streets from a building which he had entered in daylight, remarked, "This is the most deadly insult the Germans have delivered to England," and he was right. Any little town near the firing line in France is better lighted than London, and Paris is nearly normal, her lights being reduced more for the sake of economy than by fear, whereas in London the cost of lighting must be nearly normal, for the darkening is produced by paint and shades, while the lights consume as much power and fuel as ever.

One is almost tempted to think that the High Authorities keep the lights down for fear lest Mr. Pemberton-Billing might claim that he had turned them up.—C. G. G.]

TRAINING.—II.

BY "BERKELEY."

[By special request, "Berkeley" has consented to extend his article on "Training," in the hope that young officers of both Flying Services may be tempted to take an interest in the Art of War as well as in flying.—Ed.]

It has been necessary, in view of the lack of preparation in Great Britain for the conduct of a great war, to bring into being a system of intensive training for officers and men, in which the immediate essentials only of warfare are considered. Officers are prepared for one type of combat in a high degree of efficiency, whilst in other forms of the art of war they are only taught sufficient to reduce the element of surprise, should conditions change.

Professional soldiers, ably aided by many officers, whose military gifts, hidden in the years before by lack of means of living in H.M. Army, have been brought into prominence by the opportunity of war, have carried out this training with such efficiency that the best-educated soldiers in the world have been held back on the only battle front in which the British forces have a prominent part of the responsibility and the work.

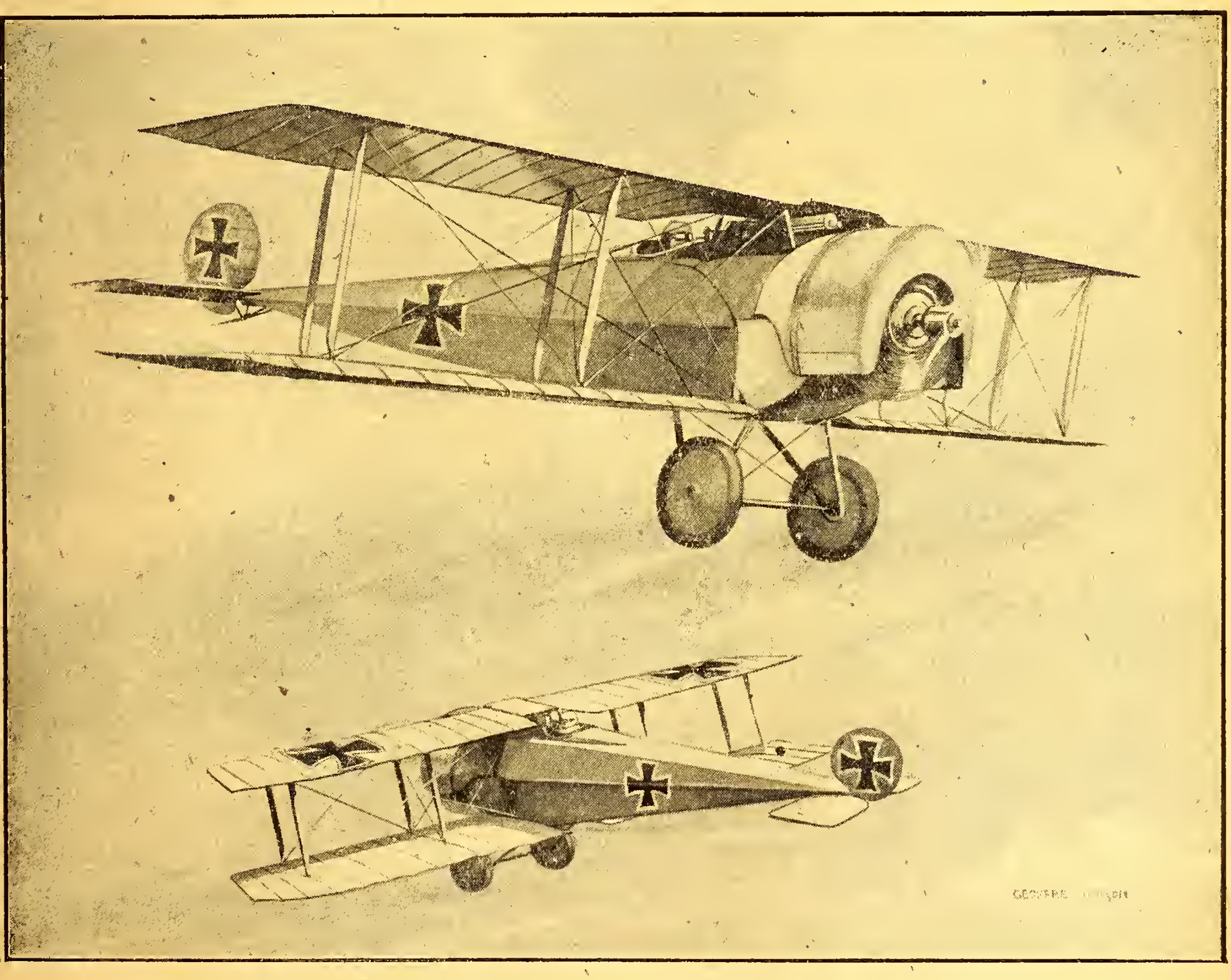
As a matter of expediency, common to all armies in the field during the later stages of the war, a limited system of training is all that is possible, with the means and in the time available. There are so many to instruct and so few capable of giving instruction. The training staff is working as hard as is humanly possible, and no time is available for giving information outside the strict limits of the prescribed course. It, therefore, is necessary for the young officer himself to continue and complete his own military education.

In all professions success depends upon personal effort. A medical student who remained content with the lectures given by his allotted professors, if he managed to evade the difficulties of examination and to pass by aid of fortune, would be a greater benefactor of the undertaker than of the human race. An artist who visited the Royal Academy, and on occasion appeared at the *atelier* of one of the modern masters of the brush, and then endeavoured to include himself in the brilliant list of those whose hands have brought dreams to life, might add to the joy of the futurists, but the world would be none the happier.

Greatness cannot be attained without work. The military life is no golden road to brilliance and success. A soldier who desires success, who wishes to fill with efficiency his place in the chain of responsibility and effort that makes an army, must learn all that his tutors may be able to give him, and then in private study expand this information until he begins to realise the immensity of his ignorance.

THE MANY THINGS TO LEARN.

The flying officer is in an unfortunate position, in so far as his early days in the Royal Flying Corps are concerned. His days are so full of instruction in the technicalities of flying itself that he has little time left for



Drawn by Geoffrey Watson from photographs published in "L'Aérophile" of a machine which landed in Switzerland.

THE NEW FOKKER BIPLANE.—One of the most consistent nuisances on the West Front. The curious lifted section in the centre of the upper plane, to clear the machine-gun, is worthy of note.

researches into strategy, tactics, and military economy. His courses in engine work, the beginning and end of aircraft, the methods of reaching the place for which he starts, the subtleties of landing, and the intricacies of bomb-dropping are enough to exhaust the enthusiasm of even the most willing.

The observer, also, if he is not a trained soldier to begin with, has even less time to himself after he has mastered his additional share of aerial work and has begun to understand the differences between the printed map and the earth as it appears from above. In many cases, officer personnel of the Royal Flying Corps is drawn from other arms of the Service, when it is probable that preliminary training has been received.

Tactical Training.

Work takes an additional interest, or perhaps its only interest, in knowing the reasons underlying its use. To report from above the movements of troops without at the same time appreciating the meaning of the movement and the result the report may have is to rob aerial reconnaissance of its principal joy. Other arms have to fight in restricted sectors, the individuals engaged understanding perhaps the immediate local success or failure of the units in their vicinity, but the general progress of the action is unknown to them.

They cannot read into the events of their sector any part of the great secret of the operations. A local success may mean a strategic failure in that a local defeat may have been intended, and similarly a sectional failure may bring about victory. The man in the trenches receives his war news in the papers, and the accuracy of the statements made therein exactly equals his own locally gained knowledge.

The flying officer, on the other hand, is in a much more favoured position. If he understands the elements of the art of war, he can read an infinity of things in his observations from above. His area of action is not circumscribed; he can see the entire battlefield, even though his duties deal only with an infinitesimal part of the area of action.

The tactical moves of the enemy are no secret to him. On occasion he can realise whether the pressure is greatest in the large sectors of the line within the range of vision by the movement of troops in support. Part of enemy strategy is open to him under favourable conditions, when, in pursuance of his duty, he bombs strategic railways on which he can see an unusual number of trains travelling in a certain direction.

Seeing It All.

It is sometimes necessary, in order that aerial observers may be able to collect certain desired information, to give the observer an insight into forthcoming operations. He is then himself in the position of a chess-player, in which he knows something of his own probable moves and bears but little responsibility in case of failure. He knows what the higher command desire, and he can see the failure or success of the enemy in countering the moves.

But before the full joy of thus sharing in warlike endeavour can be appreciated it is necessary that he who watches shall understand.

Certain things in war are obvious. Cavalry are intended to fight on horseback, and are for use in reconnaissance and in shock action. Artillery operate the big guns and prepare the way for the infantry who fight on foot. So on through the childish A B C of the arms of the Service. But all these arms are sections in a vast machine which depends for its success on its ability to work together and with the least expenditure of labour.

The Reason for the Machinery.

The young officers must learn the different steps necessary to maintain that army and bring it into action. The characteristics of the arms and their varied part in war are in a sense the end and not the beginning. As he cannot become an expert in each arm, he must of necessity acquire a general knowledge only of their attributes, and devote his time to the "general principles which govern the leading of an army in war."

His own duties are intimately connected with many of the branches of command. The preparation of orders and their transmission rely largely on the aeroplane in practice.

Before any plan of action can be laid down, it is necessary for the G.O.C.-in-C. to prepare an appreciation of the situation, embodying all that lies within his knowledge of his arm and the enemy disposition. The enemy's psychology, also, cannot be neglected. Nothing is unimportant.

In it he outlines the various methods in which he can attempt to bring victory to his arms in the shortest possible time and at the shortest possible expenditure of personnel and time—the two things of major magnitude in war. He then proceeds to define the plan which he proposes in effect to adopt.

In this manner he is enabled to consider all views of possible action in order that none may be missed. A commander does not begin with one plan and elaborate it, but with many. He selects and then elaborates. In the ordinary operations of war, it is not wise to destroy your bridges before you have established another means of escape—it is only in fables that such a course is advised.

(To be continued.)

THE DUKE OF ATHOLL.

By the death of the late Duke of Atholl, the Marquess of Tullibardine, President of the Royal Aero Club, and a Vice-President of the Aeronautical Society of Great Britain, now succeeds to the title.

THE NEXT MEETING OF THE AERONAUTICAL SOCIETY.

On Wednesday, Feb. 7th, Mr. Handley Page will read a paper on "The Case for the Big Aeroplane," and it is hoped that official permission may be given to illustrate the lecture with photographs and kinematograph films of some of the multiple-engined aeroplanes which have done so well.

The meeting will take place at the Royal Society of Arts, John Street, Adelphi—close to Charing Cross Station—and will commence at 8 p.m. A discussion will follow the reading of the paper, which, owing to Mr. Handley Page's success in this particular sphere of aircraft design, should be of the highest interest to the Services and to the Aircraft Industry.

LIGHTING ORDERS.

The Home Secretary has made the following Order under Regulation 11 of the Defence of the Realm (Consolidation) Regulations, 1914:—

(1) Any public lamp or lamps in the Metropolitan Police District or the City of London which the Commissioner of Police, acting on the advice of the Field-Marshal Commanding-in-Chief, Home Forces, directs to be lighted or retained in lighting, must be lighted or retained in lighting accordingly, and must be reduced, shaded, or obscured as the Commissioner of Police may direct.

(2) The Lights (London) Order of August 24th, 1916, shall, except as otherwise provided in paragraphs (5) and (8) thereof, apply as follows:—

During January, from 6 p.m.; February 6.30 p.m.; March, 7.30 p.m.; April, 8.30 p.m.; May, 9 p.m.; June, 9.30 p.m.; July, 9 p.m.; August, 8.30 p.m.; September, 7.30 p.m.

Till one hour before sunrise and according to Greenwich mean time in each case.

This Order may be cited as the Lights (London) Order of January 25th, 1917, and this Order and the Lights (London) Order of August 26th, 1916, may be cited together as the Lights (London) Orders.

To the Trade.

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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Jan. 23rd, 1917.

Admiralty, Jan. 19th.

Jan. 19th.—The King has been graciously pleased to give orders for the award of a Bar to the Distinguished Service Order of the undermentioned officer, in recognition of his continued gallantry and distinguished services as a Flying Officer: Comdr. Charles R. Samson, D.S.O., R.N. (Wing Comdr., R.N.A.S.). (The appointment to the Distinguished Service Order was announced in "Gazette" dated Oct. 23rd, 1914.)

R.N.A.S.—Promotions made: Wing Comdrs. to be Wing Capts.: Comdr. Robert M. Groves, D.S.O., R.N. (now Actg. Wing Capt.); Capt. William L. Elder, R.N. (now Actg. Wing Capt.); Dec. 31st, 1916.

War Office, Jan. 23rd.

REGULAR FORCES.—Establishments.—R.F.C.—Flying Officers.—Jan. 2nd, 1917: Lt. R. C. Gill, R.A., from a Flying Officer (Observer), with seny. from Oct. 21st, 1915. Sec. Lt. G. P. Jamieson, S. Wales Bord., Spec. Res., and to be secd. Lt. R. P. Baker, 11th Canadian Mtd. Rif.; Jan. 3rd, 1917. Jan. 4th, 1917: Temp. Sec. Lt. (on prob.) T. C. Luke, R.E.; Sec. Lt. J. S. Stubbs, S. Lan. R., Spec. Res., from temp. Lt. Garr. Bn. L'pool R, and to remain secd.; Sec. Lt. E. W. Kirby, Hamps. R., T.F.; temp. Sec. Lt. C. H. Dixie, Gen. List; temp. Sec. Lt. L. R. Neville, Gen. List. Jan. 5th, 1917: Temp. Sec. Lt. H. S. Wilcox, attd. E. Kent R.; Sec. Lt. (on prob.) J. G. Aronson, R. Lanc. R., Spec. Res., and to be secd.; temp. Sec. Lt. D. R. G. Mackay, attd. Arg. and Suth'd. Highrs.; temp. Capt. P. N. Logan, attd. Glouc. R.; Sec. Lt. (temp. Lt.) L. F. Beynon, Mon. R., T.F. Jan. 6th, 1917: Sec. Lt. (temp. Lt.) C. H. March, Welsh Brig., R.F.A., T.F.; Lt. H. D. O'Neill, R. Dub. Fus., Spec. Res., and to be secd.; temp. Sec. Lt. W. Bruce, attd. L'pool R.; temp. Sec. Lt. G. A. Hyde, M.C., K.R. Rif. C., and to be transfd. to Gen. List; temp. Sec. Lt. A. I. Gilson, Gen. List, Jan. 7th, 1917: Temp. Lt. A. E. Charlwood, R. Suss. R., and to be transfd. to Gen. List; Sec. Lt. L. M. Mansbridge, Dorset R., and to be secd.

Equipment Officers.—1st Cl.—From the 2nd Cl., and to be temp. Capts. whilst so empld.—Jan. 1st, 1917: Temp. Lt. A. K. Hall, Gen. List; temp. Lt. A. S. Morris, Gen. List. 3rd Cl.—Temp. Lt. R. Cadman, Gen. List, from a Flying Officer; Sept. 7th, 1916. Temp. Sec. Lt. (on prob.) C. J. Brockbank, Gen. List; Jan. 8th, 1917.

Memorandum.—Pte. J. A. Woods, from A.S.C., to be temp. Sec. Lt. (on prob.), for duty with R.F.C., Jan. 15th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on. prob.) F. O'Keeffe resigns his commn., Jan. 24th.

TERRITORIAL FORCE.—Infantry.—Hamps. R.—Sec. Lt. E. W. Kirby is secd. for duty with R.F.C., Jan. 4th.

Monmouth R.—Sec. Lt. (temp. Lt.) L. F. Beynon is secd. for duty with R.F.C., Jan. 5th.

* * *

A Supplement to the "London Gazette" issued on Jan. 23rd contains a dispatch received by the Secretary of State for War from Field-Marshal Viscount French, G.C.B., Commanding-in-Chief, Home Forces, dated: General Headquarters, Home Forces, Horse Guards, London, S.W., Dec. 31st, 1916.

The report contains the following references to the work of the Anti-Aircraft Defences:—

At the time of my assumption of command the question of the Anti-Aircraft Defences of the country was under consideration.

On Feb. 19th it was decided that the London Defences should be handed over to me, and on Feb. 26th it was further decided that I should be responsible for the whole of the Anti-Aircraft Land Defences of the United Kingdom.

Previous to this I had given considerable attention to the subject of Anti-Aircraft Defence, and I submitted a scheme for consideration, which was approved and has been carried out.

During the winter there was little hostile activity in this direction, but since I assumed charge of these Defences enemy airships and aeroplanes have invaded the country whenever conditions have admitted.

The numbers of airships taking part in a raid have varied considerably. On April 3rd only one was engaged, whilst in the raid of Sept. 2nd-3rd not less than 12 ships are believed to have taken part.

In all, 19 raids have been made by German airships and 17 attacks have been made by aeroplanes.

The damage done has been comparatively small, and nothing of any military importance has been effected.

Taken as a whole, the defensive measures have been successful. In very few cases have the enemy reached their objective. They have been turned, driven off, seriously damaged by gunfire, and attacked with great success by aeroplanes. Seven have been brought down, either as the result of gunfire or aeroplane attack, or of both combined.

The work of the Royal Flying Corps and of the Gun and Light Detachments, including the Royal Naval Anti-Aircraft Corps, has been arduous and has shown consistent improvement; the guns and lights have been effectively handled, and the pilots of the Royal Flying Corps have shown both skill and daring. All are deserving of high praise.

Close co-operation with the Navy has been maintained, and the R.N.A.S., by their constant and arduous patrol work on the coast and overseas, have shared in successful attacks on the enemy.

* * *

From the "London Gazette" Supplement, Jan. 24th, 1917.

War Office, Jan. 24th.

REGULAR FORCES.—The following Wt. and N.C.Os. to be Sec. Lts. for service in the Field:—

Memoranda.—For duty with R.F.C.—Sgt.-Maj. G. Felstead, from R.F.C., Dec. 19th, 1916. Flt. Sgt. J. Noakes, from R.F.C.; Flt. Sgt. J. B. McCudden, from R.F.C., Jan. 1st.

Wt. and N.C.Os. to be temp. Sec. Lts. (on prob.):—

Memorandum.—For duty with R.F.C.—Cpl. E. H. Baker, from A.S.C., Dec 26th, 1916. Col. L. W. Middleton, from R.E., Dec. 29th, 1916. Sgt. H. A. Croft, from A.S.C., Dec. 30th, 1916.

Staff.—Hd.-Qrs. of Admin. Servs. and Depts.—R.F.C.—Adj.—Sec. Lt. M. W. Bovill, S.R., from a Balloon Officer, and to be temp. Lt. whilst so employed, Dec. 5th, 1916.

ESTABLISHMENTS.—R.F.C.—Sqdn. Comdrs.—From Flt. Comdrs., and to be temp. Majors whilst so employed:—Lt. (temp. Capt.) W. H. Primrose, Arg. and Suth'd Highrs., T.F., Jan. 6th. Capt. A. A. Walser, M.C., Lond. R., T.F., Jan. 7th.

Flt. Comdrs.—Capt. C. H. B. Blount, M.C., R. W. Surr. R., from a Flying Officer, Nov. 7th, 1916. From Flying Officers, and to be temp. Capts. whilst so employed:—Sec. Lt. H. G. Corby, R. Muns. Fus., Jan. 1st. Sec. Lt. W. L. Scandrett, S.R., Jan. 2nd. Sec. Lt. D. C. Miller, Unattd. List, T.F., Jan. 3rd. Sec. Lt. F. E. Sargood, S.R., Jan. 6th. Sec. Lt. (temp. Lt.) W. H. A. Whitworth, Dorset R., T.F., Jan. 7th. Sec. Lt. (temp. Lt.) T. Q. Studd, Devon R., S.R., Jan. 8th. Temp. Sec. Lt. (temp. Lt.) H. T. Shaw, Gen. List, Jan. 9th. Temp. Sec. Lt. K. M. St. C. G. Leask, Gen. List, Jan. 10th.

Flying Officer.—Capt. G. H. B. McCall, Spec. Res., reverts from Flt. Comdr. to Flying Officer, Jan. 25th.

Equipment Officers, 2nd Cl.—From the 3rd Cl., and to be temp. Lts. whilst so employed:—Sec. Lt. J. V. Read, Spec. Res., Jan. 1st. Sec. Lt. C. M. Denny, Spec. Res., Jan. 8th. Lt. P. P. Eckersley, Spec. Res., from the 3rd Cl., Jan. 10th.

3rd Cl.—Temp. Sec. Lt. W. E. Smith, Gen. List, Dec. 13th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on prob.) F. G. Reid relinqs. his commn. on account of ill-health, Jan. 25th. Sec. Lt. (on prob.) P. A. Symmons resigns his commn., Jan. 25th. Sec. Lt. (on prob.) A. L. W. R. Henry-Waetjen relinqs. his commn. on account of ill-health, Jan. 25th. Sec. Lts. (on prob.) are confirmed in their rank:—F. C. Berkeley, E. Brown, G. Barnett. To be Sec. Lts. (on prob.):—R. E. Taylor, Nov. 17th, 1916. F. M. Harding, Jan. 8th. F. C. Pratt, L. R. J. Williams, F. B. Nicol, F. A. Roberts, A. H. Peake-Jones, A. S. G. Smith, P. F. Antelme, Jan. 12th.

TERRITORIAL FORCE.—R.F.C.—The following announcement is substituted for that which appeared in "Gazette" of Jan. 4th:—C. A. Walker-Leigh (late temp. Maj., Local Res. Bn., R. Fus.), to be Maj. (temp.), with precedence as from Sept. 25th, 1914, with pay and allowances of a Capt., and to be Adjt., Dec. 29th, 1916.

R.E.—Sec. Lt. E. R. Wilkinson is secd. for duty with R.F.C., Nov. 10th, 1916.

Infantry.—Norf. R.—Capt. W. E. Salter is secd. for duty with R.F.C., Jan. 5th.

Essex Regt.—Sec. Lt. E. H. Bryant is secd. for duty with the R.F.C., Jan. 5th.

* * *

The King has been graciously pleased to give directions for the following appointments to the Most Distinguished Order of Saint Michael and Saint George, in recognition of valuable services in connection with the war. To be dated Jan. 1st, 1917:—

To be Additional Members of the Third Class, or Companions, of the said Most Distinguished Order:—

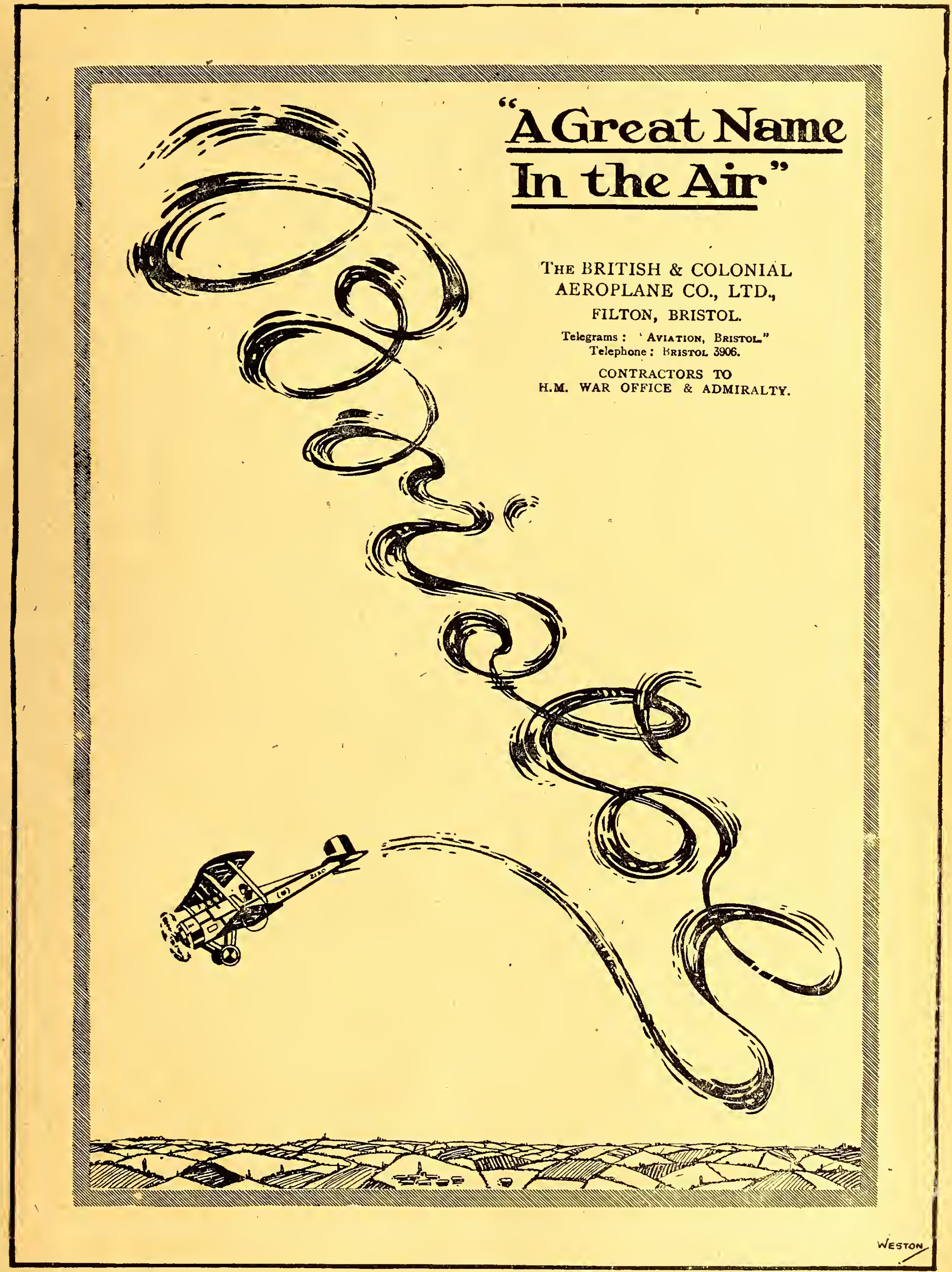
Maj.-Gen. Richard Matthews Ruck, C.B., ret. pay.

Maj. and Bt. Lt.-Col. (temp. Brig.-Gen.) Duncan Sayre MacInnes, D.S.O., R.E.

The King has been pleased to approve of the following Honours and Rewards for valuable services rendered in connection with the War, with effect from Jan. 1st, 1917, inclusive:—

To be Lieut.-General.

Maj.-Gen. (temp. Lt.-Gen.) Sir D. Henderson, K.C.B., D.S.O.



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To be Brevet Colonel.

Maj. and Bt. Lt.-Col. (temp. Brig.-Gen.) W. S. Brancker, R.A.

To be Brevet Majors.

Capt. (temp. Lt.-Col.) W. R. Freeman, D.S.O., M.C., Manch. R. and R.F.C.

Capt. (temp. Lt.-Col.) F. V. Holt, D.S.O., Oxf. and Bucks. L.I. and R.F.C.

Capt. (temp. Maj.) C. E. C. Rabagliati, M.C., York. L.I. and R.F.C.

To be Brevet Major on Promotion to the Rank of Captain.

Lt. (temp. Capt.) S. W. Smith, R.A. and R.F.C.

To be Companion of the Distinguished Service Order.

Capt. (temp. Maj.) M. G. Christie, M.C., R.F.C., Spec. Res.

Awarded a Bar to Military Cross.

Capt. John Whitaker Woodhouse, M.C., R.F.C. (S.R.)

Awarded the Military Cross.

Lt. (temp. Capt.) R. C. Lyon Holme, Som. L.I. and R.F.C.
Lt. (temp. Capt.) Henry Stewart Powell, Ceylon Rif. and R.F.C.

Awarded the Meritorious Service Medal.

24266 1st Cl. Air Mech. E. E. Childs, R.F.C.
20943 1st Cl. Air Mech. T. P. Watson, R.F.C.

* * *

From the "London Gazette" Supplement, Jan. 25th, 1917.

War Office, Jan. 25th.

REGULAR FORCES. — Establishments.—R.F.C.—Equipment Officer, 3rd Cl.—Temp. Sec. Lt. H. A. Maynard, Gen. List. Nov. 22nd, 1916.

Memorandum.—A. A. N. Pentland to be temp. Sec. Lt. for duty with R.F.C., Jan. 26th.

Infantry.—E. Surr. R.—Temp Sec. Lt. C. G. Larkin, from Gen. List, R.F.C., to be temp. Sec. Lt. (attd.), Jan. 26th, seny. from Sept. 5th, 1916.

SPECIAL RESERVE OF OFFICERS—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on prob.) G. P. C. Willeby resigns his commn., Jan. 26th.

TERRITORIAL FORCE.—R.F.C.—Sec. Lt. H. D. Teage, to be temp. Lt., Sept. 20th, 1916.

R.F.A.—Sec. Lt. (temp. Lt.) C. H. March is secd. for duty with the R.F.C., Jan. 6th.

* * *

A special Supplement to the "London Gazette," dated Jan. 25th, contains a list of officers and men mentioned in dispatches, among whom are the following officers and men of the R.F.C. :—

Birley, Capt. G. H., R. W. Surr. R. and R.F.C.
Black, Capt. C. T., R. War. R. and R.F.C.
Brandon, Capt. A. de B., D.S.O., M.C., R.F.C. (Spec. Res.).
Burnett, Maj. C. S., High. L.I. and R.F.C.
Christie, Maj. M. G., M.C., R.F.C. (Spec. Res.).
Fraser, Sec. Lt. H. H. McL., R.F.C. (Spec. Res.).
Gilley, Capt. D., Devon R. and R.F.C.
Hedges, Capt. F. R., R.F.C.
Helpman, Sec. Lt. W. G., King Edward's Horse and R.F.C.
Higgins, Maj. (temp. Lt.-Col.) T. C. R., R. Lanc. R. and R.F.C.
Holt, Capt. (temp. Lt.-Col.) F. V., D.S.O., Oxf. and Bucks L.I. and R.F.C.
Hore, Sec. Lt. C. A., N. Staffs R. and R.F.C.
McClaughry, Capt. W. A., Aust. L.H. and R.F.C.
MacInnes, Maj. and Bt. Lt.-Col. (temp. Brig.-Gen.) D. S., D.S.O., R.E.
Mackay, Sec. Lt. J. I., W. Rid. R. and R.F.C.
Marsh, Maj. A. C. E., R.A. and R.F.C. (Spec. Res.).
Morton, Capt. A. H., R.F.A. and R.F.C.
Munsie, Sub-Lt. W. G. C., R.N.V.R. and A.A.C.
Penn-Gaskell, Maj. L da C., Norf. R. and R.F.C. (killed).
Powell, Capt. H. S., Ceylon Rif. and R.F.C.
Pyott, Sec. Lt. I. V., R.F.C. (Spec. Res.).
Richardson, Capt. M. G. F., North'd Fus. and R.F.C.
Ridley, Capt. C. A., D.S.O., M.C., R. Fus. and R.F.C.
Robb, Capt. E. E., R.F.C. (Spec. Res.).
Robinson, Capt. W. L., V.C., Worc. R. and R.F.C.
Ruck, Maj.-Gen. R. M., C.B., ret. pay, Res. of Officers.
Sowery, Sec. Lt. F., D.S.O., 12th Bn. R. Fus. and R.F.C.
Sowery, Capt. J., 6th Bn., R. W. Surr. R. and R.F.C.
Tempest, Sec. Lt. W. J., D.S.O., Gen List and R.F.C.
Thomson, Maj. A. A. B., R. War. R. and R.F.C.
Tomlinson, Capt. H., M.C., R.F.C. (Spec. Res.).
Turner, Sec. Lt. McD. C., R.F.C. (Spec. Res.).
Unwin, Maj. E. F., A.S.C. and R.F.C. (killed).
Wilson, Capt. A. C., Lrs. and R.F.C.
Woodhouse, Capt. J. W., M.C., R.F.C. (Spec. Res.)
Bastable, No. 9409 Sgt. B. J., R.F.C.
Goodchild, No. 777 Flt. Sgt. C. W., R.F.C.
Held, No. 14285 1st Air Mech. A., R.F.C.
Hutton, No. 1775 Sgt.-Maj. A. E., R.F.C
Kemp, No. 775 Sgt.-Maj. S. T., R.F.C.
Peck, No. 4758 Flt. Sgt. G. F., R.F.C.

[From the fact that this list includes officers known to have been killed on home duty early in 1916, and officers decorated for attacking enemy airships over England, one deduces that the list consists of those who have done distinguished service at home. —Ed.]

From the "London Gazette" Supplement, Jan 26th, 1917.

War Office, Jan. 26th.

REGULAR FORCES. — Establishments. — R.F.C — Sqdn. Comdrs.—The appointments of the following are antedated as follows :—To June 1st, 1916 :—Sec. Lt. (temp. Major) R. G. Blomfield, 5th D. G. ; Capt. (temp. Major) Lord G. Wellesley, M.C., G. Gds. ; Capt. (temp. Major) R. E. Lewis, W.I.R. ; Lt. (temp. Major) A. A. B. Thomson, M.C., R. War. R. ; Capt. (temp. Major) E. P. Graves, R.A. ; temp. Major C. S. Wynne-Eyton, Gen. List.

To June 12th, 1916 :—Lt. (temp. Major) J. E. A. Baldwin, 8th Hrs. ; Capt. (temp. Major) F. W. Smith, S. Mid. Brig., R.F.A., T.F. ; Capt. (temp. Major) M. G. Christie, M.C., Spec. Res. ; Lt. (temp. Major) L. A. Pattinson, M.C., R. Fus. ; temp. Major E. D. Horsfall, M. C., Gen. List.

To July 1st, 1916 :—Capt. (temp. Major) H. F. Glanville, W.I.R. ; Lt. (temp. Major) W. S. Douglas, M.C., R.F.A., Spec. Res.

To July 15th, 1916.—Capt. (temp. Major) J. A. Cunningham, R.A. ; Lt. (temp. Major) L. W. Learmount, M.C., Spec. Res. ; Capt. (temp. Major) C. T. Maclean, M.C., R. Sc. Fus. ; Sec. Lt. (temp. Major) B. C. McEwen, M.C., Spec. Res. ; Capt. (temp. Major) E. L. M. L. Gower, Spec. Res. ; Capt. (temp. Major) H. Wyllie, Wilts R.,

To July 18th, 1916 :—Capt. (temp. Major) P. E. L. Gethin, Spec. Res.

To July 22nd, 1916 :—Capt. (temp. Major) B. F. Moore, R. War. R.

Lt. (temp. Major) G. L. P. Henderson, M.C., Spec. Res. ; and temp. Major B. P. Greenwood, Gen. List, to Aug. 1st, 1916.

Capt. (temp. Major) A. K. H. O'Brien, 2nd D.G., Spec. Res., to Sept. 10th, 1916.

Capt. (temp. Maj.) the Hon. J. L. E. Twistleton-Wykeham-Fiennes, Oxf. and Bucks L.I. ; and Lt. (temp. Major) J. P. C. Cooper, M.C., Spec. Res., to Sept. 15th, 1916.

Lt. (temp. Major) W. B. Hargrave, Suff. R., T.F., to Sept. 16th, 1916.

Capt. (temp. Major) H. Petre, M.C., Australian Imperial Forces, to Sept. 23rd, 1916.

Capt. (temp. Major) A. H. Morton, R.A., Oct. 1st, 1916.

Capt. (temp. Major) E. M. Murray, M.C., Queen Victoria's Own Corps of Guides, Ind. Army, to Oct. 4th, 1916.

Temp. Lt. (temp. Major) J. G. Swart, M. C., R. A., to Oct. 7th, 1916.

Capt. (temp. Major) W. Milne, M.C., N. Lan. R., to Nov. 1st, 1916.

Flt. Comdr.—Capt. R. H. Freeman, Worc. R., Spec. Res., from a Flying Officer, Dec. 23rd, 1916.

Equipment Officers, 1st Cl.—Temp. Lt. J. D. Drysdale, Gen. List, from the 2nd Cl., and to be temp. Capt. whilst so employed, Jan. 13th.

3rd Cl.—Sec. Lt. W. Sillem, Spec. Res., Nov. 24th, 1916.

Infantry.—Oxf. and Bucks L. I.—Sec. Lt. C. C. Statt is secd. for service with R.F.C., Dec. 3rd, 1916.

Suff. R.—Sec. Lt. (temp. Lt.) R. T. B. Schreiber is secd. for duty with the R.F.C., Jan. 9th.

Memoranda.—To be Sec. Lts. (on prob.) for duty with R.F.C. —Segt. E. C. Ponking, from R. Defence Corps, T.F. ; A. J. Annandale, late temp Sec. Lt. R. Ir. Rif., Jan. 12th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on prob.) F. A. D. Grace is confirmed in his rank.

To be Sec. Lts. (on prob.) :—J. E. J. Crawford, Sept. 3rd, 1916. H. F. L. Dixson, H. G. Day, S. V. Green, Jan. 8th. W. A. Merrill, H. D. B. Snelgrove, Jan. 10th. V. F. J. Barker, J. F. Crichton, H. Chapman, J. P. Clark, E. J. Dewty, H. G. Etheridge, E. L. M. Emtage, J. A. G. Harrison, W. C. Hacon, A. C. F. Hill, F. H. Isitt, G. Kitchin, Sir C. C. Mansel, Bt., L. Tunks, Jan. 12th.

* * *

The King has been pleased to confer the Military Cross on the following Officer in recognition of his gallantry and devotion to duty in the Field :—

Capt. Russell Herbert Freeman, Worcester Regt., Spec. Res. and R.F.C.

He attacked and drove off an enemy aeroplane which had forced one of our machines to land. Later, he landed and rescued the pilot under very difficult conditions. He set a fine example of courage and initiative.

* * *

From the "London Gazette" Supplement, Jan. 27th, 1917.

War Office, Jan. 27th.

REGULAR FORCES. — Establishments. – R.F.C. — Sqdn. Comdrs.—From Flt. Comdrs., and to be temp. Majors whilst so employed :—Capt. W. D. S. Sanday, D.S.O., M.C., Spec. Res., Oct. 21st, 1916. Lt. (temp. Capt.) G. V Rice, S. Mid. Brig., R.F.A., T.F., Oct. 25th, 1916. Capt. A. V Holt, R. Highrs., Lt. (temp. Capt.) O. T. Boyd, M.C., 5th Cav., Ind. Army, Capt. A. M. Morison, Spec. Res., Oct. 26th, 1916. Temp. Capt. S. G. Gilmour, Gen. List, Oct. 28th, 1916. Lt. (temp. Capt.) H. L.

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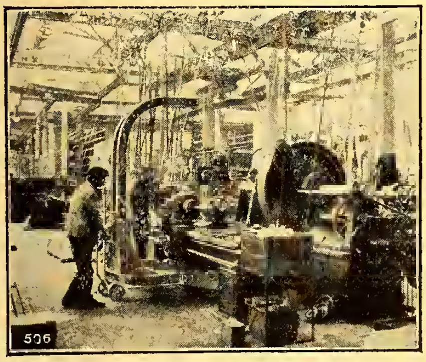

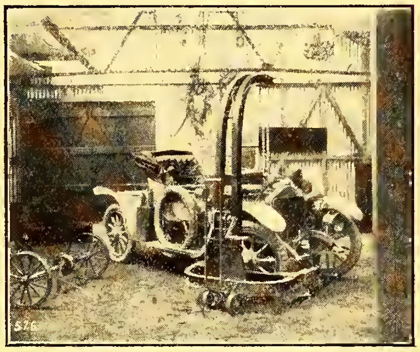

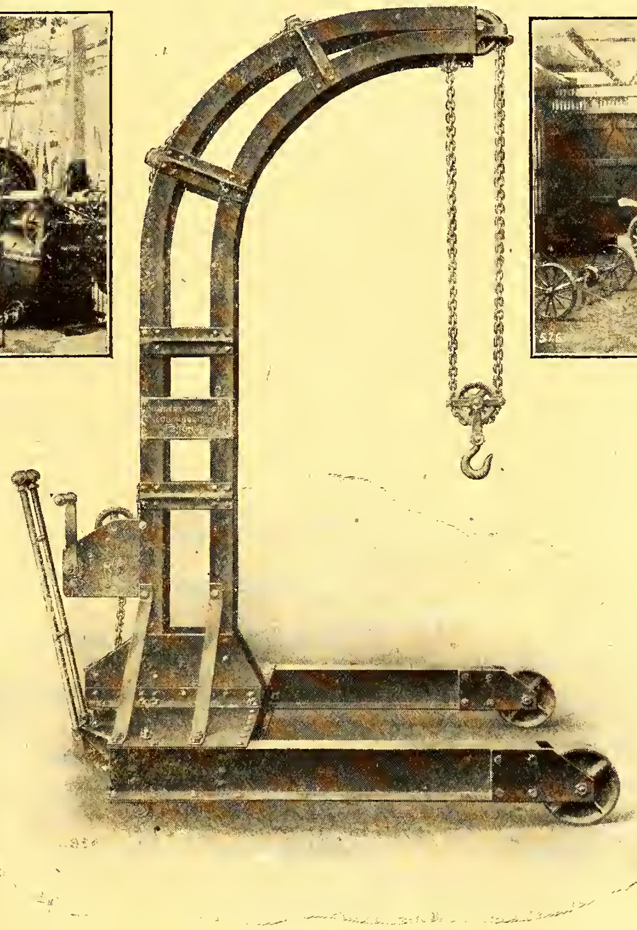

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The Crane can only travel when the handle is pulled. When let go it locks and cannot move.

It can be fitted with Small Bench and Vice if desired.

If you have one, you will soon find use for more.

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	Cwts.	Ton	Tons	Tons
WORKING LOAD	10	1	1½	2
Tested to	15	1½	2¼	3
	Ft. Ins.	Ft. Ins.	Ft. Ins.	Ft. Ins.
Distance from floor to hook, when in highest position	7 4	6 7	7 5	7 3
Distance between centres of hook and jib	3 0	2 10	3 6	3 6
Clear width between Travelling Wheels	3 4	3 4	4 4	4 4

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LOUGHBOROUGH, LEICESTERSHIRE

Cooper, Spec. Res., Nov. 1st, 1916. Temp. Capt. H. A. Van Reyneveld, M.C., Gen. List, Nov. 4th, 1916. Lt. (temp. Capt.) R. Balcombe-Brown, M.C., R.F.A., Spec. Res., Nov. 17th, 1916. Temp. Capt. J. T. Rodwell, Gen. List, Nov. 19th, 1916. Temp. Capt. E. J. Tyson, M.C., Gen. List, Nov. 21st, 1916. Sec. Lt. (temp. Capt.) J. C. Quinnell, R.A., Dec. 1st, 1916. Capt. R. E. Orton, E. Lan. R., Capt. J. R. Howett, Spec. Res., Dec. 17th, 1916. Capt. F. H. Jenkins, M.C., Spec. Res., Jan. 1st. Capt. H. de Havilland, Spec. Res., Jan. 11th.

Flt. Comdrs.—Temp. Sec. Lt. (temp. Lt.) G. A. Thompson, Gen. List, from a Flying Officer, and to be temp. Capt. whilst so employed, Dec. 17th, 1916 (substituted for notification of Jan. 9th).

Balloon Co. Comdrs (graded as Flt. Comdrs).—From Balloon Officers, Jan. 10th:—Lt. (temp. Capt.) The Hon. E. G. W. T. Knollys, Lond. R., T.F.; temp. Lt. O. Hook, Gen. List, and to be temp. Capt. whilst so employed.

Adjutant.—Lt. (temp. Capt.) C. W. Wise, A.S.C., Spec. Res., Nov. 1st, 1916.

Depot Comdrs.—From Park Comdrs., and to be temp. Lt.-Cols. whilst so employed:—Qmr. and Hon. Lt. (temp. Maj.) A. Fletcher, R.F.C., Nov. 11th, 1916. Capt. (temp. Major) G. C. R. Mumby, Spec. Res., Jan. 1st.

Inspecting Officers of Depots (Graded as Depot Comdrs.).—From Depot Comdrs., and to retain their temp. rank whilst so employed:—Capt. (temp. Lt.-Col.) R. C. Donaldson-Hudson, D.S.O., T.F. Res.; Qrmr. and Hon. Lt. (temp. Lt.-Col.) A. Fletcher, M.C., R.F.C., Jan. 1st.

Park Comdrs.—From Equipment Officers, 1st Cl., and to be temp. Majors whilst so employed:—Qrmr. and Hon. Lt. (temp. Capt.) A. Levick, R.F.C., Nov. 7th, 1916. Lt. (temp. Capt.) G. D. Hannay, Spec. Res., Nov. 23rd, 1916.

Equipment Officers, 2nd Cl.—From the 3rd Cl.:—Sec. Lt. H. J. C. Smith, Spec. Res., and to temp. Lt. whilst so employed, Dec. 1st, 1916. Lt. F. Tedman, Spec. Res., Jan. 7th.

3rd Cl.—The appt. of temp. Sec. Lt. F. D. Reynolds, Gen. List, notified in the "Gazette" of Dec. 22nd, 1916, is cancelled.

* * *

From the "London Gazette" Supplement, Jan. 29th, 1917.

War Office, Jan. 29th.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdrs.—Initials of Sec. Lt. G. T. R. Hill, M.C., Spec. Res., are as now described, and not as in the "Gazette" of Jan. 11th.

Capt. (temp. Major) C. G. Bell, Spec. Res., revts. from Sqdn. Comdr. to Flt. Comdr., and relinqs. his temp. rank, Jan. 11th, but with seny. from April 23, 1915.

Flying Officers.—Lt. C. F. Pittman, Spec. Res., from an Equipment Officer, 3rd Cl., Nov. 9th, 1916. Temp. Lt. J. W. Brown, Highld. (Howr.) Brig., R.F.A., T.F., from a Flying Officer (Observer), with seny. from April 5th, 1916. Temp. Sec. Lt. J. B. Pierce, Gen. List; Sec. Lt. F. A. D. Grace, Spec. Res.; temp. Sec. Lt. (on prob.) A. J. Arkell, Gen. List; Sec. Lt. C. C. L. Dowdall, R. Berks R., and to be secd.; temp. Sec. Lt. H. C. Calvey, A.S.C., and to be transfd. to Gen. List, Jan. 4th. Capt. W. E. Salter, Norf. R., T.F.; temp. Sec. Lt. G. H. Martingell, Gen. List, Jan. 5th. Sec. Lt. J. G. Fair, D. of Lanc. Own Yeo., T.F.; temp. Sec. Lt. L. P. Rendell, W. York. R., and to be transfd. to Gen. List; Sec. Lt. (on prob.) C. A. Parker, R.F.A., Spec. Res.; Sec. Lt. G. M. Watt, Spec. Res., Jan. 6th.

Schools of Instruction.—Central Flying School.—Instructors.—Temp. Capt. G. B. Hodgson, Gen. List, a Flt. Comdr., vice temp. Lt. (temp. Capt.) J. C. Russell, R.E., Sept. 22nd, 1916. Capt. A. C. Clarke, Welsh R., a Flt. Comdr., and to be secd., vice temp. Capt. G. B. Hodgson, Gen. List, Oct. 2nd, 1916. Temp. Capt. (Sec. Lt., Res. of Officers) Lord G. H. L. Dundas, Gen. List, a Flt. Comdr., vice Sec. Lt. (temp. Capt.) S. G. Hodges, Wilts R., Oct. 15th, 1916. Lt. (temp. Capt.) D. A. L. Davidson, M.C., Spec. Res., a Flt. Comdr., vice Capt. A. C. Clarke, Welsh R., Nov. 1st, 1916. Lt. (temp. Capt.) A. M. Wilkinson, D.S.O., Hamps R., T.F., a Flt. Comdr., vice temp. Capt. (Sec. Lt., Res. of Officers) Lord G. H. L. Dundas, Gen. List, Dec. 2nd, 1916.

Infantry.—Midd'x. R.—Temp. Sec. Lt. T. H. G. Chaplin, from Gen. List, R.F.C., to be temp. Sec. Lt. (attd.), Jan. 30th, seny. from July 7th, 1916.

Memorandum.—J. H. Solomon to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Jan. 14th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. R. L. Burdon-Sanderson resigns his commn. on account of ill-health, Oct. 27th, 1916. (Substituted for notification in "Gazette" of Oct. 26th, 1916.) Sec. Lt. F. S. Schell resigns his commn., Jan. 30th.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. T. B. Marson is secd. for duty with the R.F.C., Jan. 16th.

Sec. Lt. J. G. Fair is secd. for duty with the R.F.C., Jan. 6th.

FROM THE COURT CIRCULAR.

York Cottage, Sandringham, Jan. 24th.

The following Officer had the honour of being received by His Majesty, when the King invested him with the Insignia of Companion of the Order into which he has been admitted:—

The Distinguished Service Order.

Lt.-Col. Cyril Murphy, Royal Berks Regt. and R.F.C.

His Majesty then conferred the following decorations:—

The Military Cross.

Lt.-Col. Cyril Murphy, Royal Berks Regt. and R.F.C.
Capt. George Ward, R.F.C.
Sec. Lt. Eric Barr, Royal Field Artillery and R.F.C.

NAVAL.

The following appointments have been made in the R.N.A.S.:

Jan. 24th. — P.O. Mech. (Aircraftsmen, 2nd grade).—R. C. Crawley and C. G. Adlington, both granted temp. commissions as Sub-Lt. (R.N.V.R.), seny. Jan. 20th, and appointed to "President," addl., for R.N.A.S.

Ldg. Mech.—R. E. Ollerenshaw, granted a temp. commission as Sub-Lt. (R.N.V.R.), seny. Jan. 20th, and appointed to "President," addl., for R.N.A.S.

Jan. 27th.—The following have been entered as Prob. Flt. Officers (temp.), seny. Jan. 28th:—W. W. Scott, H. J. Newberry (Ldg. Seaman, R.N.V.R.), H. Day, R. A. Nicholson, R. F. C. Metcalfe, P. M. Dennett, C. P. Brown, M. N. Baron, D. I. B. Rock, R. C. Packe, G. N. Trace, J. N. Fisher, T. D. Manning (Ord. Seaman, R.N.V.R.), and F. W. Dalrymple.

Jan. 29th.—Act. Flt. Comdr.—J. Bird, promoted to Flt. Comdr., seny. Dec. 31st.

The following have been entered as Proby. Flt. Officers (Temp.), seny. as follows, and all appointed to "President," addl., for R.N.A.S.:—W. R. Tapper, B. R. Carter, and J. W. D. Cripps, all Jan. 25th; S. J. Read (Asst. Payr., R.N.R.), Jan. 26th; and R. D. Smith, Feb. 1st.

Sub-Lt. (Temp. R.N.V.R.).—B. Grant, promoted to Lt. (Temp.), seny. Jan. 25th.

The Casualty List.

Reported Jan. 24th.

Accidentally Injured.—Woolley, Act. Flt. Lt. Sidney J., R.N.
Hughes, Flt. Sub-Lt. Rosling M., R.N.

Reported Jan. 27th.

Seriously Injured.—Stephens, Flt. Sub-Lt. Maurice H., R.N.
Injured.—Shearer, Flt. Sub-Lt. Ambrose B., R.N.
Mitchell, Prob. Flt. Sub-Lt. Harold A., R.N.
Slightly Injured.—Young, Flt. Lt. Ryder, R.N.

PERSONAL NOTICES.

Deaths.

PARK.—Lt.-Commander William Park, D.S.C., R.N.V.R., died on Jan. 27th, at the Royal Naval Hospital, Chatham, from the after-effects of malaria, aged 31 years. He was awarded the D.S.C. for service in action during the operations in Gallipoli, when he "proved one of the most valuable spotting officers, and frequently performed most useful service."

* * *

PEBERDY.—Flt. Sub-Lt. Warner B. Peberdy, R.N., son of Mr. W. W. Peberdy, of Rugby, is reported as having failed to return from a scouting flight from Thaso Island on the 14th inst. He was educated at Rugby Lower School, and gave up a responsible position in America to join the forces. Sub-Lt. Peberdy was 34 years of age. He was universally popular with all who knew him, and was a fine specimen of the British sportsman.

While on sick leave in Ireland last Easter he did valuable work as a dispatch-rider during the rebellion, and had some entertaining adventures. His services in Flanders earned recognition, if they failed to receive it. His death will be deeply felt by all who knew and appreciated his cheerful and gallant personality.

Marriage.

MUNROE—STYLES.—The marriage arranged between Flt. Sub-Lt. Keith Ross Munroe, R.N.A.S., son of Mr. and Mrs. William Ross Munroe, of Boombah St. George, Queensland, Australia, and Ethel Nellie Styles, daughter of Mr. and Mrs. W. G. Styles, of 19, St. John's Wood Park, N.W., took place quietly on Friday, the 26th inst., at 1.30 p.m., at All Saints' Church, Finchley Road, N.W.

Births.

ANDREAE.—On Jan. 20th, at Bankside, Chislehurst, the wife of Flt. Lt. F. G. Andreae, R.N., of a son.

* * *

STEWART.—On Jan. 22nd, at "Waverley," Felixstowe, to Christian, the wife of Flt. Comdr. H. Stewart, R.N.—a son.

MILITARY.

G.H.Q. Communiqués.

Jan. 23rd, 8.35 p.m.—Our aeroplanes were active yesterday in co-operation with our artillery. One of our machines is missing.

On the 21st inst. an enemy machine was forced to descend in the neighbourhood of Aubigny (east of Amiens). The pilot and observer were made prisoners.

(*Continued on page* 347.)

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INCORPORATING AIRCRAFT ENGINEERING, AERODYNAMICS, AND MATTERS PERTAINING TO THE AERONAUTICAL ENGINEER AND THE AIRCRAFT TRADER

The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

I.—The Aircraft Manufacturing Co.

Were I beginning this series of articles in an "outside" journal, it might be necessary to explain to the man in the street that the Aircraft Industry of Great Britain had passed the stage of *posse* and was emphatically in *esse*. Readers of The Aeroplane, of course, need no such reminder; but, none the less, the time has come when a complete survey of the industry's rise and progress may be usefully and justifiably attempted, and for a dual reason.

Mr. G. Holt Thomas.

In the first place, the war has brought legions of new-comers into the aviation world who, keen though their interest may be in the developments of the hour, must of necessity lack familiarity with the doings of the past; and, secondly, there are probably but few among even the older enthusiasts who are cognisant of the dimensions to which the aircraft industry has now attained. That its size is now actually in excess of what any of us who subscribed the first 50 shares of the "Aero Club Proprietary" in 1902 could have prefigured as possible in the time is due, of course, to the exigencies of the war; but the primary purport of these articles is to show what was accomplished before the fateful Fourth of August, 1914, as well as what has been done since—so far as is compatible with Defence of the Realm considerations—and incidentally to name the men who have built up the industry, step by step, in the face of many and dire discouragements.

The First Prize Offer.

No one has done more to develop aviation from every practical point of view than Mr. G. Holt Thomas, the founder of the Aircraft Manufacturing Co. His interest in the movement was primarily journalistic, and began in 1906, when, as director of the "Graphic" and "Daily Graphic" (founded by his father), he offered a prize in the latter journal of £1,000 for "a straight flight of one mile."

Shortly afterwards, while in Paris, he went to see Henry Farman, and became convinced that flying was possible, given an engine that would run for five consecutive minutes. He followed closely all the experimental stages until 1908, when Henry Farman succeeded in winning the Archdeacon prize for fluttering round a circular course of one kilometre.

Early Activities.

In 1909 came the first Reims meeting, and from that time onwards Mr. Holt Thomas never left the public or the War Office alone, and, not only by talking or writing but by practical demonstrations, sought to impress them with the possibility of flying.

The services he thus rendered to the cause of flying, long before he became the head of a great constructing firm, were immeasurable and priceless, as I can testify from an impartial point of view but from personal knowledge. For though I had known Mr. Holt Thomas for many years, having been a member of the original editorial staff of the "Daily Graphic" from 1890 to 1898, I had not come across him for over a decade when, as acting editor of the "Car Illustrated," I became aware of the efforts he was making in the new and difficult field of aviation development. Of the obstacles he encountered, and described to me from time to time, he might well make a bookful of good stories.

On Manœuvres.

I particularly remember one example of military scepticism and obtuseness, even after the practicability of flying was an established fact, namely, at the Manœuvres in 1910.

Mr. Holt Thomas went down to Salisbury Plain, sought out the General commanding at manœuvres then in progress, and expressed the readiness of his pilot to go up at once and show what an aeroplane could do. The value of the aeroplane, it may be added, had just been strikingly demonstrated in French military circles. The General, none the less, looked blank, and with an "Excuse me, I am busy," immediately sheered off!

Blackpool and Brooklands.

Reverting to 1909, however, I may mention that Mr. Holt Thomas, as the guest of the Blackpool Corporation, went up to organise the first important meeting in Great Britain, of which, as one of the mark-tower timekeepers, I still cherish the liveliest recollections. It was here that Mr. Holt Thomas decided that Londoners ought to witness the great innovation for themselves, and he engaged the afterwards celebrated *aviateur* Paulhan to come here for three days.

For this brief period the fees asked were £2,000, but eventually, an arrangement having been come to with the Brooklands A.R.C. as to the ground, a lesser sum was named, plus a share of the gate and all expenses. Alas! the unpleasant fact was made patent that people could see an aeroplane aloft without passing the turnstiles, and when Paulhan and the Club had taken the agreed amounts, nothing was left—save a big balance on the wrong side;

but, as Mr. Holt Thomas agrees, although the venture cost him a considerable sum, the object he had in view was cheaply attained.

It is instructive to recall here two of the records created by Paulhan about that time. He put up the altitude figures to 1,150 feet, and, if only one were permitted, it would be interesting to contrast therewith the height attained by the latest product of the Aircraft Manufacuring Co. Another record was one of 99 miles in a continuous flight round the Brooklands track.

The Manchester-London Flight.

In November of the same year Mr. Holt Thomas persuaded Paulhan to fly for the "Daily Mail" £10,000 prize, and had promised to organise it and assist him in every way. They motored together from London to Manchester, and then surveyed the route by train in a guard's van plastered with contour maps, etc., and became convinced that, avoiding large towns, the flight was a perfectly possible one.

However, the aviator's bugbear, fog, prevented any attempt, and acting on the advice of Sir Frank Ree, of the L. and N.W. Railway, who said that there would always be fog somewhere on the line during the winter, the project was abandoned until the spring, with the result that the first great town-to-town cross-country flight became an accomplished fact in April, 1910. To follow it throughout, Mr. Holt Thomas engaged a special train carrying mechanics and spares. What is now the well-known London Aerodrome, at Hendon, but then consisted merely of fields, was taken for the start of the flight.

With the French Army.

Then came *the* event which, in Mr. Holt Thomas's opinion, made it absolutely necessary for this country to take up military aviation—namely, the French manœuvres in Picardy, close to the locality in which our aviators to-day are doing such extraordinary work.

Well known to the French as responsible for so much in aviation, and regarded as being largely responsible for the London-Manchester flight, which had given a great fillip to flying in France, Mr. Holt Thomas was received as an honoured guest in the military Parc d'Aviation, and had special opportunities of discussing with high officials, attachés from all countries, and the few aviators who were then in existence, the great possibilities of the "new arm"—to take the title which the "Daily Mail" accorded it on receipt of Mr. Holt Thomas's letter to that paper on his return to London, urging the immediate necessity for our own Government to act.

War Office Dealings.

Some months after this he was consulted by, and bought a few machines for, the Government, and acted as a sort of honorary adviser, whose advice, however, was seldom accepted! He also drew up schemes for the War Office by the dozen, and some of these formed the foundation of to-day's requirements.

So numerous were the aviation events thenceforward in which Mr. Holt Thomas was to the fore that it is needless to record them, but at least it may be mentioned that he could claim the first aerial post by his arrangement with Mr. Claude Grahame-White to carry a sack of mails from Blackpool to Southport in 1910. An interview at the G.P.O., whose officials he wished to interest at this date, proved particularly amusing, although carrying mails by air is certainly one way in which aeroplanes will be used after the war.

A Prophetic Effort.

I have looked up, by the way, what Mr. Holt Thomas said in the "Daily Mail" after the French manœuvres of 1910, and although written more than six years ago, when hardly anybody would believe in flying, there is nothing in the words which follow that is not true of to-day:—

The "Daily Mail" in its leader of Sept. 17th, 1910, said:—

"A new weapon of the utmost importance in war has appeared, and with that weapon our Army is almost wholly unprovided. Such is the only conclusion to be drawn from Mr. Holt Thomas' letter appearing in another column. Mr. Holt Thomas personally witnessed the operations, and as he is an expert in matters of airmanship, his opinion is of the highest value. . . . This is a revolution in the art of warfare. . . . Mr. Holt Thomas gives excellent reasons for concluding that disabling enemy's aircraft from terra firma will provide a difficult task. The hostile aeroplane will have to be put out of action by craft of its own type. Already the date is upon us when every great battle will be preceded by a battle in the firmament apart. . . ."

All this has come absolutely true to-day.

Again, after the British manœuvres, the "Daily Mail" of Sept. 21st, 1910, in its leader, refers to Mr. Holt Thomas' criticism of the neglect to use the one aeroplane there, and on Sept. 22nd said:—

"There are signs that the triumph of the 'new arm' in the French manœuvres, and Mr. Holt Thomas' vigorous criticism of the neglect with which it had hitherto been treated in the British operations, are at length being taken to heart."

There is a great deal of interesting reading in the articles, especially now, when every prophecy has come true. Mr. Holt Thomas, amongst other statements, said in the "Daily Mail" of Sept. 19th, 1910:—

"An aeroplane even now is travelling at 50 miles an hour, and I venture to prophesy in a very short time will exceed 100 miles an hour."

Another true statement. It is interesting to look back six years in such a new science as flying to see what *was* said, but it is evident that one paragraph in the "Daily Mail" leader of Sept. 21st was fully justified when it said:—

"He is an expert who knows the manner in which a great foreign army handles the aeroplane, and he has already rendered valuable service to his countrymen by calling their attention to the achievements of the 'new arm.'"

His criticism of the British use of aeroplanes was scathing:—

"My general impression was that the authorities had a vague sort of idea that there were aeroplanes about somewhere, but not what they were there for, and cared less."

"The talk of aerial scouting at the British manœuvres is, well—talk.

"It is not reckoned as a unit, it is not depended on as a source of observation.

"One thing is certain. My views as to the number of volunteers for the Aerial Service *when* it comes are correct."

The Farman Machines.

It was about this time that, holding the opinion that Henry Farman, whom he knew to have taken very great risks in attempts to fly at all, was rather hardly treated in having his machine copied right and left, Mr. Holt Thomas tried to protect Farman's rights by getting someone in England to take them up. Several of our very large firms who are now building aeroplanes as munitions of war were approached, but without success. Finally, in 1911, seeing the many accidents which he believed were needless, and believing in the merits of the Farman machines, especially in respect of safety, he started to build them in England.

He promoted no company, but agreed that when he had lost £5,000 he would be free to hand the rights back. Such was the genesis of the Aircraft Company, which eventually became the Aircraft Manufacturing Co., Limited.

Military Foresight.

He foresaw more and more the necessity of military aviation, and indeed he has stated to me within the last few days that, in his opinion, the necessity for action on our part was quite as evident in 1910 as it is to-day. It is true that the machines at the French manœuvres did not drop bombs, but it was quite apparent that they could do so, as also that they could make any observation in the enemy's country, and that it would be difficult to stop them.

There are, of course, other things, such as photography, but even at this period pilots were taking up cameras with them. Very shortly after this the French tried firing over a range of hills and observed the effect of artillery fire by aeroplane. Generally speaking, in fact, the results that might be achieved by military aviation were, as he says, just as evident six years ago as they are to-day.

Manufacturing Migrations.

Almost at the start of the Aircraft Company the assets of the Aeronautical Syndicate, founded by Mr. (now Captain) Barber, at Hendon, were purchased. Later on a move was made to larger works at Merton, and still later the Aircraft Co. returned to Hendon, where it had always possessed sheds at the Aerodrome, and occupied the very large garage built by the Metropolitan Electric Tramway and Omnibus Co., then being taken over by the L.G.O.C.

These works were, of course, regarded as enormous, but to-day they form only a small portion of the Aircraft Manufacturing Co.'s premises at Hendon.

The Genesis of the de Havillands.

In 1913, seeing that the British Government would demand British-designed machines as well as British-built, the Company realised that, while still building the Farman machines, it must have its own designing department. An agreement was made accordingly with Mr. (now Captain) Geoffrey de Havilland, of the Royal Aircraft Factory, and he became the head of the designing department of the Aircraft Manufacturing Co., with the epoch-making results which we all know.

Since that date a large and able staff has been collected round Captain de Havilland, and special departments have been established. New machines of the latest design are thus rapidly produced, and so far have been completely successful.

The Success of the A.M.C.

Mr. Holt Thomas attributes the success of the Company to the ability of the staff he has created, and the fact that the Board consists of two—namely, his brother, Mr. A. F. Thomas, and himself—so that rapid decisions are arrived at. The staff is now very large indeed, and while, among so many, it is almost invidious to mention names, he places great reliance upon Mr. Hugh Burroughes, the general manager, and Mr. G. A. Peck, the chief engineer, who is responsible for production.

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GHW.

Mr. Holt Thomas tells me that he has made a practice of throwing a great deal of responsibility upon his very able colleagues, to which they have liberally responded. Practically every foreman, it may be added, apart from the new departments, is one of the small band of workmen with whom the works were started.

Rapid Expansions.

The management of the Aircraft Manufacturing Co. constitutes a very big task, as although the concern is generally regarded as being contained in the huge works at Hendon, it actually consists of Hendon plus several large subsidiary companies in different parts of England.

War requirements have naturally made very sudden demands for largely increased production, and these have been met by increases in buildings and staff, not only at Hendon but in many other places, as it would have been absolutely impossible to put up the buildings, etc., in the time at one spot, apart from the difficulties of extra staff and labour. It has been Mr. Holt Thomas's aim throughout to bring out new models as quickly as possible with which to beat the Germans, and then to ensure rapidity of production as soon as the designs have been approved by the authorities.

The employés of the Aircraft Manufacturing Co. now amount to thousands where formerly they were hundreds, and, taking into account the subsidiary companies, the number of hands employed (many of whom are women) may be described as enormous, as also, it is not unsafe to say, is the output of machines.

Hastening Delivery.

It is not giving away national secrets to state that the Hendon works cover acres of ground, as anyone travelling on the Edgware Road can see the buildings which have sprung up to right and left of the highway. Under these vast spans of roof one finds every department and every trade necessary to the construction of a flying machine. The hundreds of feet of sliding doors facing the private flying ground enable machines to leave at any point of the big erecting shop, and in a few moments they are "off,"

Captain B. C. Hucks, R.F.C., so well known for his daring exploits as a civilian pilot before the war, is now attached to the Company. He spends his time in testing new designs and in carrying out experiments in the air. Mr. Greswell, a pilot of 1910, manages the delivery of machines, as he has done since the foundation of the firm, and Mr. Birchenough delivers daily the numerous products of *les voies des airs.*

The Gnome and Le Rhone Engine Company.

In addition to the Aircraft Manufacturing Co., there was founded in 1912 the Gnome Engine Co., now known as the Gnome and Le Rhône Engine Co., the rights in the latter engine having been taken up later.

At the outset the business consisted chiefly of selling French engines, although—a fact which is frequently quoted against the Direction of flying affairs—Mr. Holt Thomas had made an offer in 1913 to the Government that if they would place an order for fifty engines he would guarantee to start a factory for their production in England.

The Reason Why.

The reason why this offer was not accepted, he has specially asked me to point out, was in no way due to the director of the R.N.A.S., nor of the R.F.C., the heads of both Services being anxious to accept his proposal, but was solely due to the general apathy of both Government and public, and the difficulty of obtaining the necessary sanction of the Treasury to a project of this kind.

In 1913, however, he started building the world-famous Gnome—which in 1909, to quote the words of General Sir David Henderson, had "made flight possible"—at the works of Peter Hooker, Ltd., at Walthamstow. Comparatively small at that time, these works are now of very large dimensions, with a continually increasing output, although both the Gnome and Le Rhone engines are built by several other firms, by arrangement with the Company, under contract with the War Office.

The Engine Directors

The direction is the same as that of the Aircraft Manufacturing Co., Mr. Hugh Burroughes and Mr. Peck, referred to above, being on the Board and working with the general manager and director, Mr. F. W. Graham Snook. As in the case of the parent concern, acres of bricks and mortar have sprung up, and in the new factories long lines of lathes and other machine tools of the highest class show the capabilities of the firm. The air resounds with the testing of high-powered aviation engines.

Airships Limited.

At the latter end of 1912 or the beginning of 1913, Mr. Holt Thomas considered it necessary that someone should take an interest in airships. The natural sequence of this idea was an attempt to obtain the rights in the Zeppelin through Prince Henry of Prussia, but with complete lack of success, the reason for which it is not difficult at this date to discern.

The next step was the formation of "Airships Limited" to take up the rights for the highly successful "Astra Torres" airship, built in France, the first example of which was supplied to the Admiralty at the beginning of 1914. The company named has supplied complete details and blue prints for the construction of these ships.

The creation of what is properly known as the "Blimp," a type which is constantly seen hovering over the vicinities of London, is due to Mr. Holt Thomas, his idea being to build the smallest airship possible. With this object in view Mr. E. T. Willows joined the company after its inauguration, and by arrangement with the authorities the first "Blimp" was built to prove the merits of the idea.

The factory, which consists of the Aircraft Co.'s old premises at Merton, is also largely devoted to the production of observation kite-balloons, or "sausages," including at the same time spherical balloons or any lighter-than-air as opposed to heavier-than-air craft.

A Life Work.

One might refer, did space permit, to other subsidiary business in which the Aircraft Manufacturing Co. has controlling or important interests. Enough has been said, however, to show the high position in the aircraft construction world which Mr. Holt Thomas has built up for himself and his coadjutors; but by no means the least interesting factor in his life history is the great amount of public-spirited and invaluable work which he performed as a pioneer before embarking upon the work of actual production.

A USEFUL SMALL WORKS HANDBOOK.

Some time back McBride, Nast and Co. published a very useful handbook on "Speeding-Up" factory output, but at that time many works managers had scarcely realised that there was a war in progress. Now, however, that efficiency is becoming a habit rather than a joke, it may be well to remind readers of this book's existence. Perhaps the following review from the "Motor Trader" may indicate handily the value of the book:—

"Among a number of comparatively recent handbooks for the guidance of works managers and others concerned in munitions is one by George H. Mansfield, author of 'The Motor Accountant' and 'Repair Shops and Stores Accounts.' Its scope is indicated by the title, 'Small Factory Output and How to Speed It.' As the author points out in his preface, he is actively engaged on small parts production, so that much of his advice may be considered both practical and practicable for others to follow.

"There are nine chapters, covering 64 pages (6¼ by 4⅝ inches, wide margin); the subject being treated under the following heads:—Limits, Methods and Hints on Manufacture, Arrangement of Factory Departments, Selection of Men, etc., Tools, Stores and Instruments, Work Taking and Progress Records, Inspection, Viewing and Marking Out, Raw Material, Stores, etc., Results of Mis-organisation, and Finishing-off Articles.

"The somewhat novel term, 'Work taker,' we find on referring to Chapter 5, which deals with the subject, suggests a combination of qualities associated with piece setting and pricing with the duties of output organiser. Clearly the post is no sinecure, and in a small parts shop would probably be the best paid position, as well as being certainly the most responsible one.

"Though there is little that can be styled novel in the outlook of this book, it has the considerable merit of being pithy, and, so far as we have discovered, nothing is omitted likely to prejudice the quality and earning capacity of a small works and plant. The book should interest garage repair shop owners and jobbing engineers generally, by reason of its numerous drawings of suggested shops, lay-outs, its many hints and sensible suggestions, as well as the already cited factor of its author being himself a doer, and having a first-hand knowledge of the commerce of factory organisation.

"The publishers are McBride, Nast and Co., Ltd., at 2, Breams Buildings, Chancery Lane, E.C., and the price is 1s. 3d. net (postage 3d. extra). It can be obtained also from the Aircraft Supplies Co., Ltd. (of which the author is the owner), at 17, John Street, Theobald's Road, W.C."

A HEALTHY VOLUME.

The "British Trade Review," which appeals particularly to foreign and colonial importers and exporters, has just produced a special issue which deserves the attention of all business men desiring to do trade abroad. Incidentally, one notices therein the advertisements of a good many firms in this country who ought to be of use to aircraft builders, both for raw materials and for the manufacture of parts of aircraft. This issue contains a number of special articles on various phases of trade, such as "Foreign Trade in 1916," "British Industrial Development," "The Dearth of Tonnage," "Trade after the War," "The Development of the Aircraft Industry," and so forth. There is also an article on "Catalogues as Salesmen," which should interest aircraft manufacturers who are considering foreign business when the war is over. The price of this issue is 6d., and it can be obtained from Wm. Duff and Son, Ltd., 113, Cannon Street, E.C.

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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

1916 IN REVIEW.

(*Continued from page* 284.)

Having mentioned such a thing as inherent limitations in regard to the rotary type, it may be as well to set forth these as they are—"without prejudice," as the lawyers say—so that we can see how far further development of the type is practicable. Unquestionably, they cool themselves well; so well indeed that but for defective carburation and a certain delicacy of control which renders them a little above the skill of every pilot, they should never overheat. Still, I think more might be made of even this quality, if it had ever struck anybody to fit stationary curved vanes, diagonally set, around the inside of the cowl, so as to induce sharp currents round the back and bases of the cylinders.

Certain Species Limitations.

The chief defect of the type is not so much its thirst for petrol—as most rotaries do not actually average more than three-quarters of a pint per horse-power hour—as its consumption of lubricant. For this—which is well admitted—there are several reasons, long since discussed in these columns, which appear to be irremediable. That being so, we at once have restricted travel radius, as one limitation. Not that this greatly matters for tactical reconnaissance, but to my mind it is a disqualifying element for any other military purpose. Then there is the matter of gyroscopic action. Concerning which I take leave to disagree wholly with Captain Barber. I maintain that apart from its effect in actual flying, it tends to twist the entire structure of a tractor fuselage out of truth. On my side I have at least all those designers such as Ligez and Isaacson—in his original design—who have endeavoured to cancel out this couple by making their motors bi-rotary: that is, giving the crank a rotary motion in the opposite direction.

Then there is the matter of power. Before the war there were rotaries of 18 and 20 cylinders, with a maximum of very much less than 200 h.p., and obviously a maximum of gyroscopic couple. The most ingenious proposition I have seen to overcome both limitations was, I believe, Mr. James Radley's. The photograph I saw at any rate—no matter whose—represented three or four rotaries strung on a common power-shaft; the triad or quad to be slung, no doubt beneath a tunnelled fuselage.

An Ingenious Power-Scheme.

In such a practical proposition one can see possibilities. The tunnel for such an arrangement would be of no great diameter, and would find plenty of room beneath the huge fuselage for which such a plant would be designed. It could readily be armoured with a cuirass, to complete the neatest of ovoid hull-sections; yet be admirably accessible; nothing more so, or so usefully, for a really big machine. The shaft would be carried in a strong thrust bearing at both ends.

Again, if divided into two or four sections, dowelled up together, so that the motor units could rotate oppositely in pairs or alternates, all gyroscopic couples would be cancelled out. Make the shafting hollow and the typical rotary mixture feed system could be retained, no matter whether the shafting carried sprockets or gears for transmission.

Altogether, I have seen no scheme so clever for adapting the rotary principle to really high powers for very big machines; thus prolonging the military usefulness of a type of which large stocks must exist. So much so, that I wish I could claim its authorship beyond these few suggestions as to its possibilities. At any rate, even as a mere sun-picture proposition—and the original Beau de Rochas four-stroke cycle was nothing so definite—it deserves to be regarded as one of the more remarkable aero-motor developments of the period between 1913 and 1916.

Alternative Developments

All good and well. On the other hand, one is bound to admit that no compactness of power-plant, no advantage of any kind would result that could not have been better and easier gained from another development—a rather revived proposition—of the period in review; namely, the horizontal eight or twelve with opposed cylinders. Or, best of all, from a still more remarkable and original type, produced since the war experimentally, and now, I understand, perfected; the revolving Maude motor with its opposed cylinders parallel to its axis, the bevel-geared cranks of each pair tracking round a central stationary crown bevel; and because merely tracking or rolling thereon, not imparting motion as to an inertia-mass, wasting no power.

The I.C. Turbine?

All of which—and much more with regard to this notable aero-motor—was described in these columns some months ago; everything going to show that it represents the maximum so far attained of mechanical compactness and power combined. Still another alternative worth consideration is the use of certain i.c. turbine propositions of which two, at least, have latterly come within my personal ken. These are as yet in the experimental stage, but until they are abandoned finally, it is as well to keep an open mind as to their possible success. For if otherwise efficient, their obus-type alone would be one of their strongest qualifications for aero-motor use: all the more that they would have to be installed in pairs, run counterwise, to cancel out each other's gyroscopic couple.

Type: And the Fuel Question.

Reverting, however, to the actual rotary type, its final limitation—at least in regard to the commercial aviation of the early future—would seem to centre in the fuel question. Now it is just short of a certainty that the whole of eastern England overlies one vast oilfield; and at no such depth as is commonly tapped at Maikop or the mid-Caucasus fields. But it is known that it will contain little or no benzine. Until, then, western Europe or Morocco proves oil-bearing and benziniferous withal, we must look to coal distillations and benzol.

Now, let enthusiasts who know nothing about oil matters beyond the scarcity prate as they will about hundred-million-gallon possibilities for coal-spirit, their ideas should not mislead us for a moment. Such an annual aggregate might well be created two years hence; or more probably ten. But a paper aggregate of that kind is wholly fallacious, made up, as it would be, in local multiples under a hundred tons each per colliery per month. When therefore you can show me the parity of even five thousand tons *at one crack per refinery group in the same time*—after the fashion of f.o.b. New Orleans, Philadelphia, Bayonne, N.J., Constanza, Batoum, or Balik Pappau, then you may begin to talk about commercial competition with petroleum-spirit. Not until then.

The Real Issue.

So all that sort of after-the-war story, believe me, is for very long after the war. It is to-day's market production—you might say possibility—that chiefly affects the motor-proposition. Inci-

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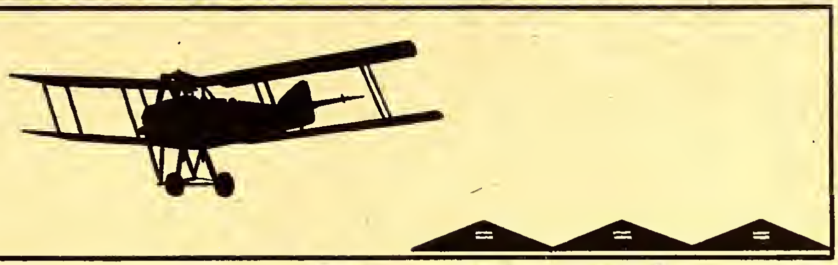

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dentally, it is almost as much on bulk-production account as for any consequent extension of flight-radius, that the latest object of scientific research is for some fuel that can show a reduction, not from pints to half-pints, but to ounces per h.-p.

Now in this regard the rotary's taste is admittedly—shall we say?—delicate. Preferring a gravity of .710 or lighter, it refuses anything above .735 at the outside, no matter how even the distillation scale may be. Any mere atomisation of kerosene—which an old-type Antoinette, for instance, would gobble cheerfully—would be out of the question: and the cleverest vaporisation—still more any of the halfway cracking systems that are being foisted as petrol substitutes—a highly doubtful and unreliable affair. As for any such highly concentrated explosive fuel as I have just suggested, no rotary as such is, or would be, mechanically strong enough to live with it.

And its Logical Outcome.

Whereas a V type of an appropriate design, fairly certainly—and even a radial possibly—might stand up to so highly potent a fuel. The chances, too, would be neither less nor more favourable to a revolving motor, if well knit up throughout its length. While—when it comes along commercially—the mechanical constitution of an internal-impulse type i.c. turbine—should be particularly favourable to such a fuel. And since something of the kind may arrive soon enough—who knows?—we only get a very incomplete impression of to-day's, yesterday's, and the day before's motor-developments, in their true strength, unless we also review to-morrow's possibilities, whereby they will be proved or found wanting.

A Link-Type.

So we come—as by a link between one group and another—to the famous mystery-motor, the Isaacson. It may be arranged to work either as a rotary or a radial; and, as I have said, is very much akin in mechanical principle to the French bi-rotary type. For purely personal reasons, it happens that I have been less enabled to probe the mystery—if any—of this motor than anybody else would be.

But latterly, I understand, its proprietary have taken its production much more vigorously in hand: so much so as to bring it to official notice and distinct favour. I know, at any rate, that the few pilots who had an opportunity of trying it out in regular work before the war — when it was a radial — always spoke highly of its trustworthiness. [The old original Flanders-Isaacson is still running well on a Hall School machine at Hendon.—Ed.]

Radial Group Developments.

Much of what has already been said applies—at least in my opinion, for what it may be worth—on general principles, to the radial type; albeit in a less degree. There were, before the war, in existence if not in any great commercial production, several makes of this type, such as the Viale, the X type Favata and Berthand—this last a two-stroker—and the Edelweiss with its external connecting-rods.

The fan-type variety—as chiefly represented by the R.E.P. and the original Anzani model—largely shares in the general qualities of the type, of course. And then, since their special design is more a question of certain mechanical features than of rotary or radial function, it is probable that some of the lesser-known rotaries now, so to say, in abeyance, would be better adapted to work as radials.

Some Inherent Type Advantages.

For, as Esnault-Pelterie pointed out ten years ago, the radial scheme has the advantages of obtaining a better use of the crank, a more regular "motive couple," and a complete balance of inertia-masses.

Whereas, smooth as the action of a rotary appears to be, it must not be forgotten that the entire cylinder group is eccentric to the real centre of mechanical motion, the crank-pin. Therefore the throw of the entire mass of it must be as many times as the number of cylinders, heavier than that of the single sets of reciprocating parts in the radial which are moving outwards, and balanced by those others which are moving inwards.

Moreover, it is obvious that the more we multiply the cylinders, these conditions are increased, for the worse in the rotary; if not for the better in the radial, the latter being a moot point.

Certain Physical Reasons Why.

To the full, also, the radial shares with the rotary the physical advantage—mostly unrecognised—of a short "through" length and consequent shortened c.g. shift-path. Aero-scientists are mostly so obfuscated with their own projective speculations that they overlook this point of plain seaman-craft; which is nevertheless the fundamental one of aerial navigation; even more so, if possible, than of marine.

Indeed, in view of that hopeless see-saw proposition, the Antoinette monoplane, it is difficult to say how far monoplane development, and the evolution of the tractor generally, would not have been retarded, had not rotaries, radials, and fan-type models been available. For the same reasons, too, never is any one of the three seen to better advantage than on a "pusher." Lastly, the radial does afford greater scope for design. Port-exhausting—the *echappement anticipè*—with all its disencumberment of parts, is only one automatic possibility; for even two-stroke development—all but out of the question in the rotary—becomes more amenable, by simple adaptation of the known scheme.

As to the Salmson.

All established results, then, have clearly favoured the survival and war-development of the two best-known radials, the Anzani and the Salmson. Each is a proverb for trustworthiness; the latter even more so, if possible, since its manufacture was taken in hand by the Dudbridge Ironworks Co.: albeit they had to "learn how." They have, I understand, developed it up to a positive 200 h.p., and thus far, perfected its running. Whether to any higher power, or to what degree of absolute reliability, I cannot say: since it is all but impossible to follow the training of every new horse in every stable. At any rate, the design still retains its initial feature of the final internal balance over the crank motion.

Furthermore, the record of the Salmson as to petrol and oil consumption and cooling is quite good: so much so as to give it a travel radius as long as most. If, too, one regards its cylinder unit, and—seeing how comparatively little, as a four-stroke proposition, goes thereto—thus observes the simplicity of the design; and if, again, one sees how uncommonly fine the construction of every detail is, one becomes still less inclined to imagine disadvantages, or argue them seriously. There at last seems to be the Service aero-motor, *hors concours*. It use by hundreds apparently bears out this belief. But is this an accident of war-necessity, or a development in the light of a complete comprehension of Service conditions, and of the real standard of requirements?

(*To be continued.*)

DOCKING DIRIGIBLES.

(*From "Aviation," New York, Dec. 15th,* 1916.)

Great dirigibles are no longer docked by manual labour. It takes to hold a big Zeppelin at the entrance to its shed, immovable against the wind, almost as many men as would suffice to hold a steamer against the tide, according to the Boston "Transcript." The lateral air movement imperils the Zeppelin by threatening to jam it against the shed. To anchor it to the ground against any side pull while it is moved ahead, the means chosen is to lay a single rail on either side running into the shed in the direction of the ship's course in entering, with four-wheeled clamps rolling easily along these rails and made fast to her sides with lines. Instead of a great crowd of men pulling at the ship direct, a handful pull at these clamps, and roll the ship into her harbour; and she is held more securely than she ever could have been before. The running in and out of the shed is performed expeditiously, two of the propellers even being used occasionally to speed the ship along. The purpose of this manœuvre is to take advantage of any short lull in the wind.—

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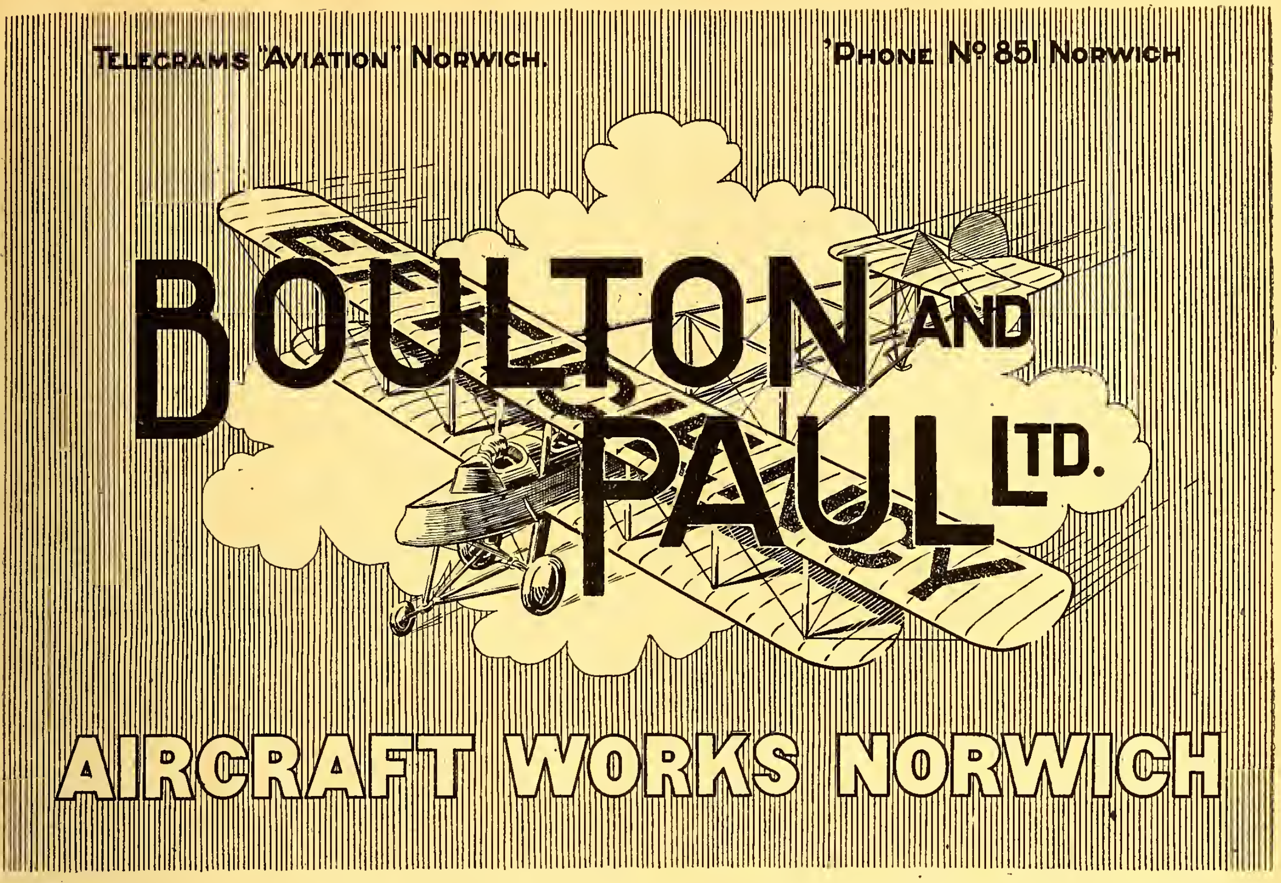

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The Time Machine.

Mr. H. G. Wells, in writing his romantic story about the Time Machine, attempted to suggest what might be the fourth dimension of the Universe. Whether he arrived at the logical conclusion or not is beyond the power of the average individual to determine, but be that as it may, the time factor is undoubtedly the fourth dimension of successful manufacture.

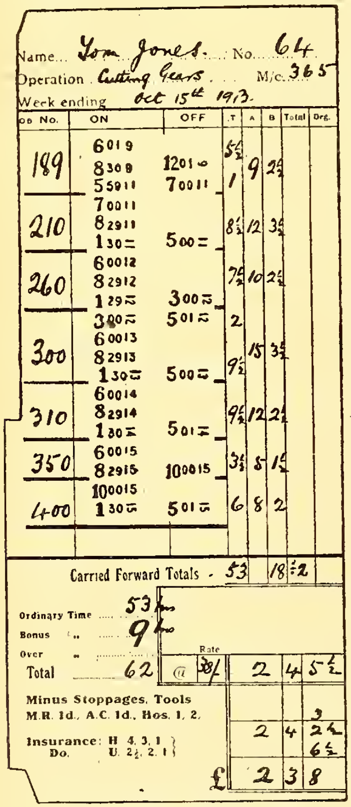
In the making of munitions, and in engineering work of all kinds, the cost of labour is one of the most expensive items in production, and unless a very close check is kept upon the time factor in production, with a view to preventing waste anywhere, financial disaster is bound to overtake any firm sooner or later.

The systems invented for the acurate computation of labour costs are legion, involving vastly varying degrees of clerical labour. Some of them rely entirely on manual book-keeping, or card index systems, or on mechanical recorders, and some on combinations of any two or all systems.

One of the most ingenious and successful systems is that produced by the Gledhill-Brook Time Recorders, Ltd. Briefly, this consists of an accurate timepiece capable of printing the time of day and the date on any time or job card which may be inserted in the printing device incorporated in the timepiece.

In its most primitive form this merely consists of a record of the time when a workman commences and finishes work in the morning and afternoon. In its more elaborate forms the apparatus is capable of recording and dissecting the costs of carrying out the manufacture and repair of articles involving the greatest degree of elaborate and specialised work.

The simple time card for recording the number of hours worked by an employee is shown in the illustration. Every morning when commencing work he takes his card from the rack at the side of the clock and pushes it into the printing slot of the machine, and the time is automatically marked in the right place. When he stops for dinner, restarts afterwards, and finishes at night, the time is recorded in each case, and the costing clerk, by calculating the number of hours worked, is easily able to add up the total work done for the week, and, by multiplying that with the hourly rate, he determines the amount payable to the workman.



Name Tom Jones. No. 64
Operation Cutting Gears M/c. 365
Week ending Oct 15th 1913.

Job No.	ON	OFF	T	A	B	Total	Org.
189	6019 8309 55911	12019 70011	5½ 1	9	2½		
210	70011 82911 13011	50011	8½	12	3½		
260	60012 82912 12912	30012	7½	10	2½		
300	30012 60013 82913 13013	50112 50013	2 9½	15	3½		
310	60014 82914 13014	50114	9½	12	2½		
350	60015 82915	100015	3½	5	1½		
400	100015 13015	50115	6	8	2		
Carried Forward Totals			53		18÷2		

Ordinary Time 53 hrs
Bonus " 9 hrs
Over "
Total 62 @ 38/ Rate £2 4s. 5½d.
Minus Stoppages, Tools
M.R. 1d., A.C. 1d., Hos. 1, 2. 3d.
Insurance: H 4, 3, 1 / Do. U. 2½, 2, 1 — 2 4 2½ / 6½
£ 2 3 8

A Typical Time Card.

The illustration gives an example of the work of this system, which also allows for a bonus on time saved over the period estimated by the firm.

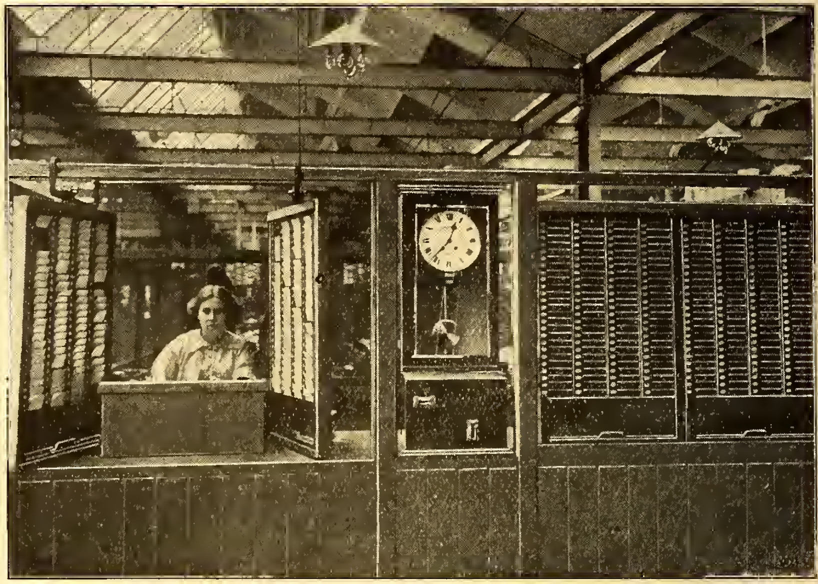
This card shows a job starting at 6.01 a.m. on October 9th. The 9 being upright indicates a.m., and sideways shows p.m. Thus the workman is shown as "IN" morning 6.01 a.m., "IN" 8.30 a.m., "OUT" 12.1 p.m., returns to work Monday 11th at 5.59 a.m., finishes job 189 at 7 a.m.

The card therefore shows the employee "IN" morning, "IN" breakfast, "IN" noon, 'OUT" night, the time of completion of job and the time of commencement on the new job is clocked on the same card.

Thus job 210 is clocked on at 7 a.m., the same time as another job is finished, and is in its turn completed at 5 p.m. on the 11th.

For instance :—

New Job 260 started 6 a.m. on the 12th.
finished 3 p.m. ,, 12th.
,, 300 started 3 p.m. ,, 12th.
finished 5 p.m. ,, 13th.
,, 310 started 6 a.m. ,, 14th.
finished 5 p.m. ,, 14th.
New Job 350 started 6 a.m. on the 15th.
finished 10 a.m. ,, 15th.
,, 400 started 10 a.m. ,, 15th.
finished 5 p.m. ,, 15th.



A Gledhill-Brook Time Machine, showing Racks for Time and Job Cards. The Job Card is given out by the Costs Clerk with the Job, and is returned with it.

This completes the week's record for seven jobs.

The columns indicated by the letters T. A. B. are used for the following purposes :—

A.—Time allowed.
T.—Time taken.
B.—Bonus.

From the calculations on card you will see that 53 hours total time is recorded, and the time saved over that allowed is 18 hours; the firm in question divide this by two and the workman therefore receives a bonus of nine hours.

The carrying out shows therefore the wages paid at the rate of 38s. per week of 53 normal hours plus bonus of 9 hours = 62 hours £2 4s. 5½d., less deductions for mess room 1d., athletic club 1d., hospital 1d., 3d.; £2 4s. 2½d. Less insurance: Health 4d., unemployment 2½d., 6½d. leaving balance of £2 3s. 8d.

The "Clipper" Machine.

So far as recording the labour put into the execution of a definite job is concerned, the "Clipper" type of time recorder is the most satisfactory. The "Clipper" machine is fitted with an ingenious arrangement whereby the time punched on the card travels down one space every time the card is inserted into the machine, just in the same way as successive impressions made by a typewriter occur in horizontal progression on the paper, only in the case of the job card in the "Clipper" machine the progression is vertical.

The arrangement is worked by a clipping machine which cuts a notch into the side of the card and allows it to be punched under the printing device; every time the card goes into the machine the notch is cut one line deeper, which allows the card to go correspondingly farther into the machine.

This type of card shows how long different workmen who handle the job in succession take to perform their different operations at their varying rates of pay and the addition of these amounts indicates the whole labour cost of the job.

At the back of the job card a table may be arranged for recording the price of the raw material put into the work, and by adding this to the cost of the labour recorded on the front of the card the total cost of the whole job is recorded, and if a previous estimate has been given, the profit or loss on the transaction may be seen at a glance.

Of course, the "Clipper" machine can be used equally well for recording pure time work, and it has the advantage over the earlier system in the saving of space, because at whatever times and days he may choose to work, each record on a worker's card is made immediately under the preceding one, which results in a considerable saving of space in the files.

The whole apparatus is most ingeniously made, and those aircraft manufacturers who wish to keep a really accurate check on all classes of costing will be well advised to communicate with Mr. Gledhill, who will be pleased at all times to arrange a system suited to the peculiar needs of any individual cases.

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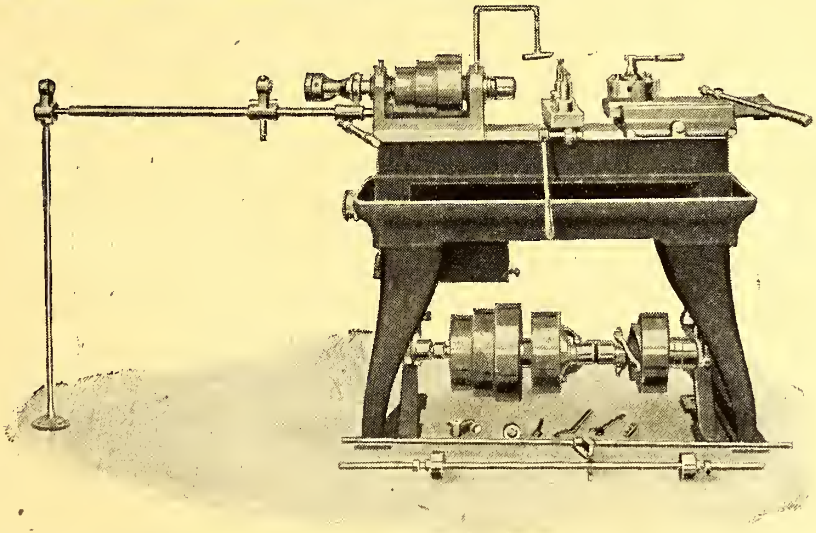

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Of Interest to Schools.

Incidentally, one would seriously suggest the adoption of the Gledhill-Brook Time Recorder for use at flying schools for checking the amount of instruction received by each individual pilot, the amount of work done by each machine, the hours run by each engine during its lifetime, and between periods of taking down, and the amount of petrol consumed on each day instruction took place. This can be done quite simply by providing each pilot with a time card and each machine and engine with a card of its own, and also a petrol card for each aeroplane. It would then merely be necessary for the person in charge of the machine for the time being to use the corresponding cards.

THE ALLIES AND THE HISPANO-SUIZA ENGINES.

The following notes are reproduced from "Aviation," New York, of December 15th, 1916:—

According to "España Automòvil y Aeronautica," issue of October 30th, 1916, the Hispano-Suiza Works of Paris and Barcelona are building 2,000 150 horse-power aero-engines for use with the French and Spanish aviation services, and additional orders aggregating 4,275 engines of the same model have been awarded to the following concessionaires:

	Engines
France.	
Société des Automobiles Ariès, Paris	400
Société des Automobiles Brasier, Paris	600
Etablissements Doriot-Flandrin, Paris	375
Leflaive et Cie, Saint-Etienne	300
Société des Automobiles Peugeot, Paris	500
Aéroplanes Voisin, Paris	200
Total	2,375
Great Britain.	
Royal Aircraft Factory	200
Italy.	
Società Ceirano Automobili Torino	200
Russia.	
Russian War Office	500
United States.	
General Aeronautic Co. of America, Inc. (Wright-Martin Aircraft Corp.), New York	1,000
Grand total	4,275

The accompanying table list gives the principal dimensions and data of the French and British military aeroplanes and seaplanes which are fitted with 150 h.p. Hispano-Suiza engines.

The Hispano-Suiza Works are also about to place on the market an eight-cylinder V-type aircraft engine developing 200 h.p. which will be practically identical with their 150 h.p. model, but for a geared down drive. This new engine will be fitted to the following aeroplanes which are now building in France:

Blériot, four-engined; Bréguet, single and twin-engined bombing aeroplanes; Caudron, two-engined; Donnet, seaplane; Delaunay-Belleville, two-engined; Farman, two-seater reconnaissance aeroplane; F. B. A., seaplane; Morane-Saulnier, twin-engined aeroplane; Nieuport, two-seater reconnaissance aeroplane; S. P. A. D., two-seater single and twin-engined pursuit aeroplanes; Tellier, seaplane; Voisin, four-engined bombardment aeroplane.

[N.B.—The Aeroplane takes no responsibility for the accuracy of any of the figures, but the general line of the information is of interest, and it is as well to make it known in this country, seeing that it must have reached Germany from Spain some months ago.—Ed.]

A BARIMAR REPAIR.

The bottom half of the 4-ton Packard truck crank-case illustrated was sent to a firm of "welders" to repair. The staff succeeded in producing the monstrosity shown in Fig. 1. In this distorted condition it was useless, a fit subject for the scrap-heap. But as the owners had been using the "Packard" exclusively on urgent Government work, something had to be done to make good the defect.

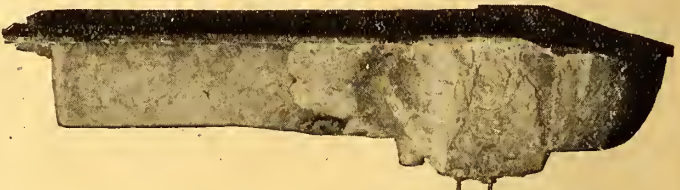

Fig. 1.—A Bad Botch.

It was decided to send it to Barimar, Ltd. To Barimar accordingly the botch was sent. Before a permanent repair could be made, the scientific experts had to perform a surgical operation, and a bad excrescence had to be cut out.

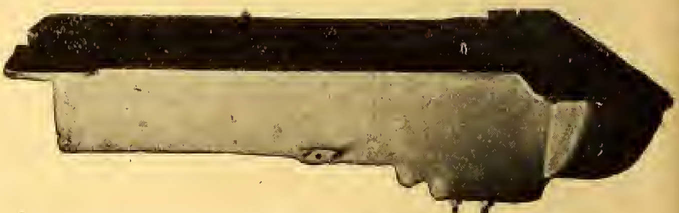

Fig. 2.—Barimar Scientific Experts produce a Perfect Part

The case was so distorted that it was 1¼ in. out of square. Barimar's therefore cast a new piece, fitted and welded it into position, brought the case back into line, and completed the whole process to the entire satisfaction of the owner in seven clear working days. The result, seen in Fig. 2, is a re-created part, strong, durable, and indistinguishable from new.

When in trouble with machine fractures, no matter what the material, Barimar, Ltd., 10, Poland Street, W., can be relied upon to do all that is possible to cure the trouble.

THE CURTISS MODEL R.4 TRACTOR.

With the exception of a central 12-ft. wing section, the Model R.4 is similar to the machine used by Victor Carlstrom in his flight from Chicago to New York. In Carlstrom's "New York Times" machine the central 2 ft. 6 in. wing panel over the fuselage was removed, and in its place a panel 12 ft. long was added, the extra surface being necessary to carry the great weight of fuel sufficient for this flight.

General Dimensions.

Span, upper plane	48 ft. 6 in.
Span, lower plane	38 ft. 2 in.
Chord	6 ft. 3 in.
Gap	6 ft. 8 in.
Length overall	28 ft. 9 in.
Height overall	13 ft. 0 in.
Motor, Curtiss	200 h.p.
Speed range	90-50 m.p.h.
Net weight	1,800 lbs.

Make.	Type.	Area (sq. m.)	Useful load (kg.)	Revs. per minute.	Horiz. speed (km.)	Climbing Speed.		
						1000 m.	2000 m.	3000 m.
Nieuport ...	Two-seater tractor biplane	30	375	1,500	157	4′ 45″	12′ 20″	25′ 3″
F.B.A.	Two-seater seaplane	42	425	1,520	143	6′ 40″	14′ 50″	22′ 30″
F.B.A.	Two-seater seaplane	42	500	1,250	143	7′ —	18′ —	......
B.E. (British)	Two-seater tractor biplane	32	300	1,600	160	3′ 50″	9′ 4″	16′ —
Donnet	Two-seater seaplane	37	500	1,580	140	9′ —	22′ —	......
S.P.A.D.	One-seater pursuit monoplane ...	18	210	1,700	200	3′ —	6′ —	10′ 30″
Blériot	One-seater pursuit monoplane ...	18	210	1,700	200	3′ —	6′ —	10′ 30″
Letord*	Two-seater biplane	56	550	1,600	...	......	......	......
Caudron	Two-seater biplane	64	625	1,550	142	7′ 10″	17′ —	28′ 40″
Demonge* ...	Two-seater biplane	28	280	1,600	...	......	......	......
Nieuport† ...	Single-seater tractor biplane	35	350	1,500	...	......	......	......
Nieuport† ...	Twin-engined biplane	60	600	1,500	...	......	......	......
Morane†	Twin-engined tractor	55	...	....	...	......	......	......
Sopwith† ...	Two-seater tractor biplane	32	250	....	...	......	......	......

* Trials proceeding. † Building.

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THE PLANES.

The planes are formed to the R.A.F. 6 curve. At the front spar the wings are 5¼ in. thick. The planes are set at an angle of incidence of 2½ deg. Dihedral angle, 3 deg. There is a stagger of 12 5/8 in. Chord, 6 ft. 3 in.; gap between planes, 6 ft. 8 in.

Panel over fuselage, 2 ft. 6 in. wide. A space of 1 3/8 in. is left between this panel and upper wing extension, and between the fuselage and lower wing. From the central panel the upper planes extend 23 ft., bringing the overall span to 48 ft. 6 in. From the fuselage the lower planes extend 17 ft. 10 in., bringing the overall span to 38 ft. 2 in.

The forward main wing spars are 10 in. from the leading edge; the spars are 4 ft. apart. The wing curve, between leading edge and forward main spar, is formed of veneer. The top of lower planes, between the two ribs next to the fuselage, is covered with veneer and rubber matting, so that the passenger can walk upon the planes in getting to the forward cockpit.

The interplane struts are centred 6 ft. 6 in. from the fuselage struts. They are of streamline section, 4½ in. deep at the centre, 1 5/8 in. thick; tapering to 2 in. deep at the ends, and 1 in. thick. The outer struts are 13 ft. 10 in. from the fuselage. These are 3½ in. deep at the centre, 1 3/8 in. thick; tapering to 1 7/8 in. deep at the ends, and 7/8 in. thick. The overhang bracing is carried on 16 in. struts on top of the upper plane. Below the outer struts 1 in. bowed rattan buffers are provided to keep the wing tips from touching the ground in starting and alighting.

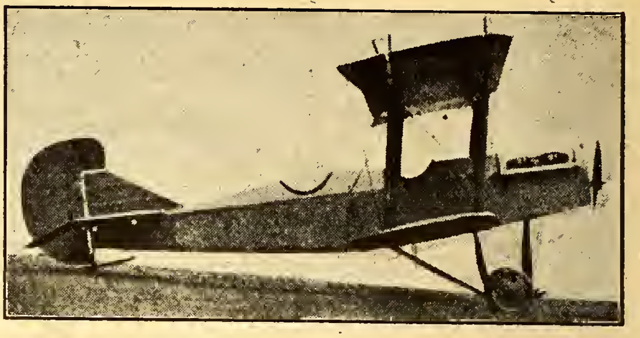
Wiring between forward and rear struts is No. 8 stranded cable. Flying wires of inner panel are No. 6 gauge; landing wires No. 8. The outer panel is wired with No. 8 cable. Landing wires single; flying wires doubled. The planes are braced to the radiator by No. 6 gauge cables.

The two ailerons on the upper plane are 12 ft. 8 in. long, 16 in. wide; the two ailerons on lower plane 7 ft. 8 in. long, 16 in. wide. One streamline steel tube connects the upper with the lower aileron.

THE FUSELAGE.

The fuselage is 24 ft. 6 in. long. The longitudinals at the radiator are 1 5/8 in. by 1 1/4 in. ash, tapering to 1 1/4 in. square at the pilot's seat, and continuing in taper to the tail. The uprights in the forward part of the fuselage are straight channeled spruce, braced with stranded cable. The rear uprights and spacers in the rear section of the fuselage are tapered and bevelled spruce, braced with solid wires.

Forward of the front struts the fuselage is covered with sheet steel. The fuselage top, as far back as the pilot's seat, is formed of sheet steel. Elsewhere the covering is linen. From the rear seat to the leading edge of the stabilising plane the curved fuselage top is removable for inspection and adjustment of wiring, being held to the upper longerons by a strip of sheet steel with provision for attachment by cotter pins.



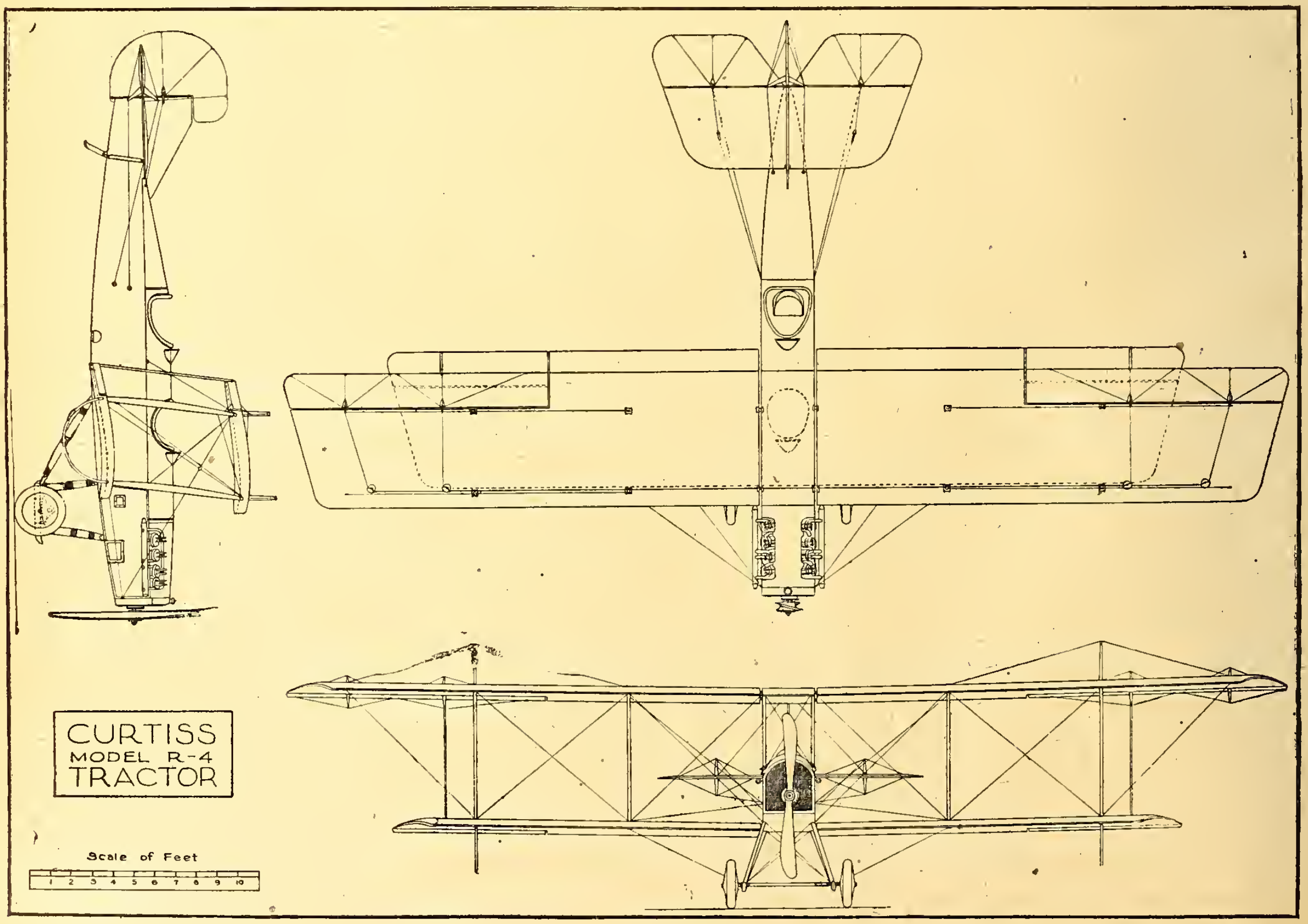
The Model R-4 Curtiss Tractor.

CONTROL GEAR.

Dep. control is fitted. The rudder wires are doubled No. 8 cable to rudder levers; from the levers two solid No. 12 wires run to the rear edge. A slotted disc of leather is provided where the rudder controls pass through the fuselage top. Tail flap control wires, No. 6 cable to the levers. From each lever three solid No. 12 wires run to the trailing edge of flaps. Where cables pass through the side of the fuselage slotted discs of heavy pigskin are stitched to the fuselage covering.

INSTRUMENTS.

The dashboard equipment consists of Ogilvie air speed indicator, Taylor altimeter reading to 10,000 ft., Warner electric clock, Stewart-Warner revolution indicator, U.S. oil gauge, Manhattan magneto switch, Taylor or Jesnig fore and aft level and inclinometer. A Sperry compass is held in brackets extending down from the dashboard. Electric lights are disposed about the cockpit and dashboard so as to render all instruments readable. Suitable controls are located at the side of the cockpit for the adjustment of the magneto and carburettor. A Lunkenheim pump is fitted on the outside of the fuselage within easy reach of the pilot.



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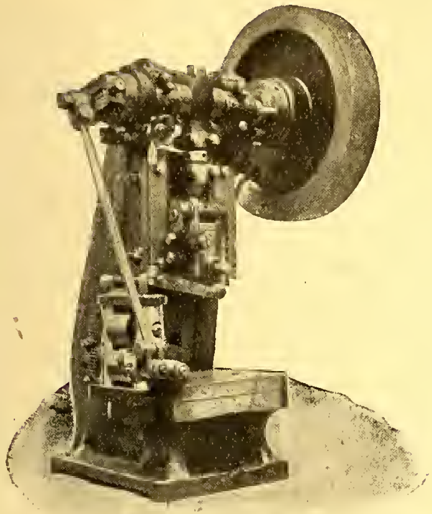

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JAN. 24th, 9.20 p.m.—Very considerable aerial activity took place yesterday on both sides. In the course of air fighting one of our machines was brought down; six German aeroplanes were destroyed, and three German aeroplanes were driven down in a damaged condition. Another two of our machines are missing.

JAN. 25th, 9.10 p.m.—There was much aerial activity during yesterday on both sides. One enemy machine was brought down by our anti-aircraft guns, and in the course of air combats four other German machines were destroyed, and three more driven down damaged. Three of our machines are missing.

JAN. 26th, 9.5. p.m.—Yesterday our aeroplanes successfully bombed a number of places behind the enemy's lines.

There were many air fights, in the course of which five German machines were destroyed, and five others driven down in a damaged condition. One of our aeroplanes is missing.

JAN. 27th, 9.25 p.m.—Hostile aircraft showed less enterprise yesterday. Much useful work was done by our aeroplanes, and two enemy machines were destroyed. Another enemy machine was forced to land in a damaged condition.

Two of our machines are missing. Of the enemy machines destroyed since the 23rd instant, six fell on our side of the line.

JAN. 28th, 8.45 p.m.—Four German aeroplanes were destroyed yesterday in the course of air combats, three of which fell in our lines. Another hostile machine was driven down damaged.

JAN. 29th, 9 p.m.—Much successful work was accomplished by our aeroplanes yesterday, and some fighting took place in the air. One enemy machine was destroyed. One of our machines is missing.

THE CASUALTY LIST.

Reported Jan. 25th.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED.—Charles Capt. L. S., Worcester R. and R.F.C.

PREVIOUSLY REPORTED PRISONER OF WAR, NOW REPORTED WOUNDED AND PRISONER OF WAR IN GERMAN HANDS.—Evans, Sec. Lt. H. F., R.H.A. and R.F.C.

Reported Jan. 26th.

PREVIOUSLY REPORTED MISSING, NOW REPORTED WOUNDED AND PRISONER IN GERMAN HANDS.—Curlewis, Sec. Lt. I., M.C., R.F.C.

PREVIOUSLY REPORTED PRISONERS, NOW REPORTED WOUNDED AND PRISONERS IN GERMAN HANDS.—Anderson, Lt. A., Connaught Rangers, attd. R.F.C.

Knowlden, Sec. Lt. W. E., Border Regt., attd. R.F.C.

Reported Jan. 27th.

KILLED.—R.F.C.—Stooke, 15792 1st Cl. Air Mech. A. A. (Carlby, Stamford).

Reported Jan. 29th.

KILLED.—Hodgson, Sec. Lt. A. H., R.F.C.

Kellett, Sec. Lt. W., Somerset L.I., attd. R.F.C.

Woodley, Sec. Lt. S. W., R.F.C.

WOUNDED.—Foster, Capt. C. E. W., R.F.C.

DIED.—R.F.C.—Nicholson, 224056 2nd Cl. Air Mech. G. A. (Edinburgh).

Reported Jan. 30th.

DIED OF WOUNDS.—White, Sec. Lt. F. R., R.E., attd. R.F.C.

DIED.—R.F.C.—Doran, 3720 2nd Cl. Air Mech. H. (Belfast).

PERSONAL NOTICES.

DEATHS.

EVANS.—At Farnborough, on Jan. 24th, while Lt. Philip Evans, R.F.C., was flying at a great height over the aerodrome, his machine made a spinning nose-dive and crashed to the ground, immediately bursting into flames. Mr. Evans was burned to death.

* * *

GOODDEN.—On Jan. 28th, F. W. Goodden (Maj., R.F.C., Spec. Res.) was killed while flying.

There is no more foolish maxim in this world than "*de mortuis nil nisi bonum.*" One does more service to humanity by telling some of the truth about a man and leaving him to work out his own salvation in the next world, than by pretending that he was one of the elect while on earth. Therefore, let us dispense with the usual cant.

Goodden's first connection with aerial navigation was as a mechanic with Mr. E. T. Willows when that gentleman drove his little airship, with Goodden as passenger, from London to Douai, and ultimately to Paris. Prior to that he had, one gathers, been an exhibition balloonist and parachute jumper.

Some time later he appeared as a pupil at Hendon, where he later became an instructor at the Caudron school, whence he transferred to the Grahame-White Co., and developed into a very clever aerial acrobat. On the death of the late Mr. Hamel, Goodden took over his machine and proceeded to give numerous exhibitions on his own account, till the outbreak of war.

Thereafter, finding that trick-flying somehow "failed to attract" during the early part of the war, he joined the Royal Aircraft Factory as a tester, and owing to his skill in getting the very best possible performance out of officially designed aeroplanes, good, bad and indifferent, he won official favour in spite of, or, perhaps, because of the fact that these "maximum," or, perhaps, one might say, "optimum," performances, were not always equalled by the standard machines of the same type turned out at the R.A.F. or elsewhere.

Meantime, Goodden rose high in official esteem, and was made a commissioned officer in the R.F.C., Special Reserve.

His services as an expert were apparently so highly valued by his employers that he was advanced to the rank of Major without having flown on real active service, and without having spent any very long period at a time in France, whither, one gathers, he paid certain visits on occasion in order to demonstrate to the sceptical the alleged excellence of R.A.F. products. His rank as Major thus enabled him to argue on equal military terms with Squadron Commanders, whose active service, experience and military training might lead them to disagree with the claims made by the R.A.F. on behalf of their products.

His engineering experience, if any, was small, and one recalls an occasion when at an inquest concerned with the collapse of a machine of R.A.F. design he blamed the breakage onto bad material, whereas engineers who were not witnesses at the inquest were of the opinion that the breakage was due to crystalisation of material caused by vibration owing to defective design.

As a trick-flier he was undoubtedly clever, though given to taking needless risks, and one assumes from the published reports of his death that it occurred in the course of one of those performances such as won him his reputation as a flier. By Major Goodden's death the Royal Aircraft Factory, or, rather, the old régime thereof, has lost one of its most faithful servants.

One gathers that on the morning of the accident, Major Goodden took a fast biplane of R.A.F. design, and of a type which has already produced criticism, for its final test before it was handed over for use. Apparently the wings broke off near the body, and Major Goodden was found dead in the wreck.

* * *

HARTNELL.—At an inquest held on Jan. 24th, on John Bernard Hartnell, 26, Flt. Sgt., R.F.C., who was killed in an aeroplane accident in Kent, it was stated that the machine lost flying speed and made a nose-dive from about 500 ft., but had the machine been 5,000 ft. up, it would probably have landed safely. The pilot escaped with injuries, but Hartnell, who belongs to White Gate, County Cork, was killed. A verdict of death from misadventure was returned.

* * *

HELE-SHAW.—Lt. Henry Rathbone Hele-Shaw, R.F.C., previously reported missing on July 19th last, now unofficially reported shot down in aerial action with his machine and killed, aged 20 years, was the only son of Dr. and Mrs Hele-Shaw, of Coleherne Court, S.W. He was educated at Sandroyd Preparatory School and at Marlborough. When war broke out he had just taken an open scholarship at Clare College, Cambridge, but he immediately enlisted in the Public Schools Brigade, and obtained a commission shortly afterwards in the R.G.A.

A year later he obtained his pilot's certificate, and was gazetted to the R.F.C. He acted as a ferry pilot through last winter, and was then selected for a squadron, with which he went to the front. After some weeks of fighting he was reported wounded. On his recovery he flew again, and almost immediately after, during an engagement in which the flight had difficulty in keeping together because of the clouds, his machine disappeared and was not seen again.

His C.O. wrote:—"He was a good pilot, very keen, and ready to do any job, and we can do with them like that."

* * *

HODGSON.—Sec. Lt. A. H. Hodgson, R.F.C., killed, was an old Foundation scholar of the Manchester Grammar School, who passed his senior school certificate in 1913, and won a Langworthy scholarship in 1914. He was football captain and vice-captain of the school. The name of Mr. Hodgson appeared in the list of fallen officers published on Jan. 29th.

* * *

KELLETT.—Sec. Lt. William Kellett, Somerset Light Infantry, attached R.F.C., killed as the result of an aeroplane collision, was the brother of Mrs. Cecil Rayner, Richmond Mount, Headingley, Leeds. He joined the Hussars at the outbreak of war, and later obtained a commission in the Somerset Light Infantry, with which regiment he saw much fighting. A few months ago he was transferred to the R.F.C. as an observer. Mr. Kellett was recently mentioned in dispatches.

* * *

PARSONS.—Two officers flying over Charlton Park, near Malmesbury, on Jan. 23rd, landed to inquire their way. On ascending again they had only reached a height of about 100 ft. when the aeroplane fell to earth. Sec. Lt. B. F. Parsons, R.F.C., died three hours after admission to Malmesbury Hospital, while Sec. Lt. C. B. Fenton, his companion, an Australian, was very severely injured.

Mr. A. L. Forrester (coroner for North Wilts) conducted an inquiry in the Council Chambers, Malmesbury, on Jan. 24th, into the circumstances connected with the death of Sec. Lt. B. F. Parsons.

Capt. Ernest Henry Johnston, R.F.C., gave evidence of identification, and said deceased's full name was Beresford Frank

Parsons, a Sec. Lieut. Royal Warwick Regt., attached R.F.C. He was 21 years of age. Witness examined the machine, which was a new one. Sec. Lt. Fenton had been detailed to collect and deliver the aeroplane, and the deceased was passenger. Witness found the log-book among the wreckage, and that confirmed his personal knowledge that the machine had been passed by the Army official tester as being fit to fly.

Robert Baker said that about 11 a.m. on the previous day an aeroplane appeared overhead. It eventually descended near the Crudwell lodge. Two officers got out, deceased being one of them, and asked their whereabouts. After a few more inquiries the two officers re-entered the aeroplane and started off. The engine was going all the time the aeroplane was on the ground.

Soon after the machine left the ground there was a report like the cap in a gun going off, the engine stopped, and the machine nosed downwards to the ground.

Capt. F. S. Barnwell, R.F.C., who designed the machine which was wrecked, said he was attached to a firm of aeroplane manufacturers as designer. He was the last person to fly the machine since the official test. He flew it on Jan. 14th, and it was then in perfect order. Since that date it had not been flown. It was officially tested on Jan. 4th.

The Coroner: And passed as fit for service?

Witness: It had a bit of the engine sent back to the Rolls-Royce people. It had a leak of oil, and that was why I flew it. That was corrected; it was only the bearings that wanted tightening.

Dr. R. M. Moore, of Malmesbury, said he was called for to go to Charlton Park on Jan. 23rd. On arriving there he found the aeroplane on the ground, and the two officers covered with rags lying beside it. Lieut. Parsons was suffering from severe injuries, obviously caused by the fall, and, with the other officer, was removed to the Cottage Hospital. Lieut. Parsons died from fracture of the base of the skull about 2.30.

Frederick Mayer said he was in charge of the aeroplane engines in a certain district for the War Office, prior to the engines being handed over to the R.F.C. He ran the engine for Mr. Fenton before he started. As witness got out, Mr. Fenton got into the machine, and the engine was then in good order. From what a previous witness had said about hearing a slight report, witness thought that might have been caused by insufficient pressure in the fuel tank owing to the machine having remained on the ground with the engine running comparatively slowly. When the machine was handed over to the pilot there was ample pressure; the engine had been running for some considerable time. Witness asked the pilot if he was fully acquainted with the various instruments and attachments, and he said he was. From that witness understood that he had had experience.

Mr. Lea (a juryman): Would the lack of pressure be sufficient to cause the accident?

Witness: It would cause failure of fuel in the carburettor, and it would cause a decided popping sound.

Mr. Lea: Would it interfere with the stability of the machine?

Witness: The machine would lose flying power, perhaps.

Capt. Johnston, re-called, was asked by the Coroner to state his opinion as an expert. From the evidence he had heard, and from the condition of the machine, he should say that when the engine failed the pilot endeavoured to bring the machine down into the same field, but in turning lost flying speed, and in consequence the machine fell. Mr. Fenton had proved himself a reliable pilot, and had also previously flown the same type of machine to the satisfaction of his instructors.

* * *

POTTER.—An aeroplane accident occurred on Jan. 24th near a Yorkshire town in which Cpl. Potter, a mechanic, was killed, and the pilot, Lt. Metcalf, was injured.

* * *

STANLEY.—1st A.M. Raymond Wilfred Stanley, of a Reserve Squadron R.F.C., was killed while flying on Jan. 17th. He was the youngest son of Isaac and Annie Sophia Stanley, of "Kingsmoor," Cleeve Prior, Evesham, and late of "Newlands," Arboretum Road, Walsall, aged 26. He was buried at the Village Church, Cleeve Prior.

* * *

VAVASOUR.—Lt. Rollo Vavasour, R.F.C., who died in hospital in London on Jan. 16th, was the second son of Mr. Henry Vavasour, Blenheim, New Zealand. A member of one of our oldest English Roman Catholic families, he was educated at the Jesuit College, Sydney, N.S.W. On the outbreak of the war he endeavoured to obtain a commission in the New Zealand Expeditionary Force, but was unsuccessful. He paid his own passage to England, and was eventually gazetted to the Royal Artillery in May, 1915. After some months' training he was transferred to the R.F.C., and became a pilot in November of the same year. Early in 1916 he proceeded to the front with his squadron, and was at once recognised as a daring and resourceful pilot. On one occasion, when at an altitude of 10,000 ft., he was attacked by a Fokker, and a bullet passed between his legs, perforating the lubricating oil tank, but by cool and skilful handling of his machine, he was able to land safely inside the British lines. On another occasion he had a prolonged encounter with a Fokker, and succeeded in bringing his antagonist to the ground. Ultimately his health gave way, and he was invalided home in the late autumn of 1916. After recuperating he was appointed Flt. Instructor at an important training centre for pilots, but his health again broke down, and he was operated upon for appendicitis. The funeral took place at the Catholic Cemetery, West Brompton, with military honours.

* * *

WYNN.—Sec. Lt. Ernest Wynn, R.F.C., who has died in hospital, was a son of Mr. A. E. Wynn, of Rathgowry, Harrogate. His machine was brought down in the enemy lines on Nov. 1st, after which he was reported missing. A War Office official message states that, according to a German report, he died in hospital the same day. He was 20 years of age, and formerly a student at the University of Leeds.

ENGAGEMENTS.

BIRLEY—KNIGHT.—The engagement is announced between Capt. George Hornby Birley, R.F.C., younger son of the late Mr. Francis Hornby Birley and of Mrs. Birley, and Mary, daughter of Mr. Richard William Knight, of Buckminster, Leicestershire.

* * *

DANIELL—OAKLEY.—The marriage arranged between Maj. T. E. St. Clare Daniell, R.F.C., son of Mr. and Mrs. R. T. Daniell, of Cheltenham, and Brenda, younger daughter of Mr. and Mrs. F. J. Oakley, of Sutton Lodge, Oatlands Park, Weybridge, will take place on Saturday, Feb. 10th, at St. Mary's Church, Oatlands Park, at 2.30. There will be no invitations, but all friends will be most welcome at the church, and afterwards at Sutton Lodge.

MARRIAGES.

BOND.—McHARDY.—On the 23rd inst., Sec. Lt. William Arthur Bond, M.C., K.O.Y.L.I., attached R.F.C., eldest son of Mr. and Mrs. Arthur Bond, Chesterfield, was married to Aimée Constance, younger daughter of the late Wm. Arnott McHardy and Mrs. Weller, 240, Oxford Street, W.

* * *

CAMERON—MORRIS.—On Jan. 21st, Lt. Ewen Cameron, Yeomanry and R.F.C., was married to Vera Morris, of Great Staughton, Huntingdonshire.

* * *

COLMAN—LITTLE.—On Jan. 20th, at St. Barnabas, Kensington, by the Rev. Canon Colman, uncle of bridegroom, and the Rev. A. H. Haigh, Lt. Edward Charles Colman, Wilts Regt. and R.F.C., elder son of Edward Colman, Kingston Hill, was married to Ena Heseltine, daughter of the late Arthur H. Little, Southport, and Mrs. Hanson, and step-daughter of H. J. Hanson, Oakwood Court.

* * *

HARRISON—JOLLIFFE.—On Jan. 22nd, at the Congregational Church, Newbury, by the Rev. H. E. Heywood, assisted by the Rev. J. W. Harford, Roland Harrison, Lt. H.A.C., R.F.C. (T.F.), was married to Kathleen Frances Harriett, daughter of Mr. and Mrs. H. W. Jolliffe, of Newbury, Berks.

BIRTH.

WHITE.—On Jan. 27th, at 38, Roland Gardens, South Kensington, the wife of Lt. E. Neville L. White, R.N. (retired) and R.F.C., of a son.

While Lt. Newton, R.F.C., was piloting an aeroplane at Farnborough on Jan. 23rd, he was compelled to attempt a landing on the outskirts of the town owing to engine trouble. He made for a large field, but his machine touched some trees and dived into the county stream near Farnborough Station. Mr. Newton was severely injured about the head and back, and was taken to the Cambridge Hospital. He is, however, expected to recover. Air Mechanic Bradbeer, who was a passenger, escaped without serious injury. The machine was wrecked.

* * *

A serious accident occurred near Aldershot on Jan. 29th, when Lt. Crossfield and Lt. Hobson were badly injured while flying. Little hope is entertained of Mr. Hobson's recovery.

* * *

Those who have followed the fortunes of the R.F.C. with interest from its early days will have been glad to note last week in the "Gazette" of Jan. 19th the promotion of Major J. H. W. Becke, D.S.O., Notts and Derby Regt., from Wing Commander, R.F.C., and temporary Lt.-Col. to be Brigade Commander, R.F.C., and temporary Brigadier-General.

General Becke was one of the first officers of the Line to join the R.F.C. after it ceased to be the Air Battalion R.E. and became a separate Corps, and he was one of the original officers of the famous No. 2 Squadron at Montrose which did so much cross-country flying in a period when cross-country flights were very considerable adventures. The flights of No. 2 Squadron under Major Burke from Farnborough to Montrose, Montrose to Limerick and back, and Montrose to Netheravon in the July before war began, made history where British aeronautics were concerned, and if the pilots of the squadron had been required to

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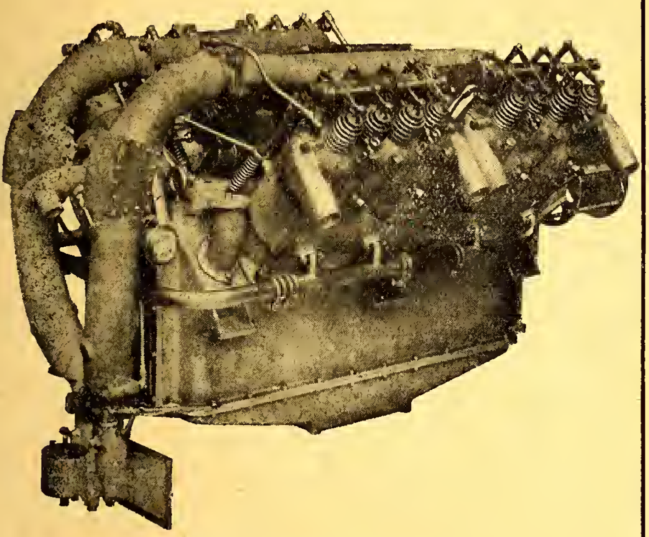

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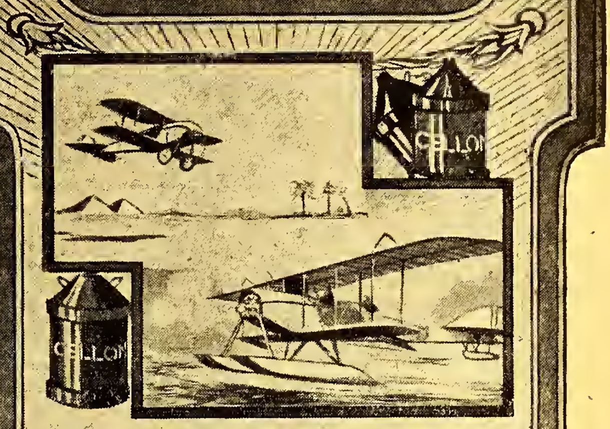

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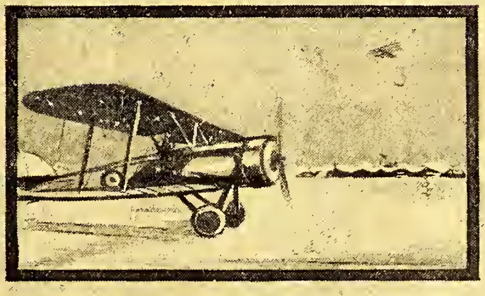

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compete with the leading French cross-country fliers they would at least have proved their equals.

Of the three then senior pilots of the squadron Capt. Longcroft and Capt. Becke are now Brigadier-Generals, and Capt. Dawes is a Lt.-Col., and all wear the D.S.O., and certain decorations awarded by our Allies. The junior pilots who were then subalterns, among them Lieuts. Harvey-Kelly, Martyn, and Dawes (junior), are Majors commanding Squadrons. All have distinguished themselves on active service, and of the original squadron which left Montrose before the war nearly all the pilots survive, despite many narrow escapes in the early days of the war. Which seems evidence that the old No 2 Squadron was not composed merely of fine fliers but of able officers.

Such was recognised to be the case by those who knew the squadron. Capt. Longcroft was then generally estimated to be the finest pilot in the R.F.C., Capt. Becke, though a less spectacular flier, had the reputation of being unsurpassed in coolness and skill, and Capt. Dawes was regarded as a safe pilot, who always arrived at his journey's end with as little incident as possible. All were known as excellent administrative officers, as capable in their military work as in their flying. Junior officers and men trusted them and esteemed them highly, which is always the best test of an officer's worth. One may, therefore, assume that any officers and men of the old No. 2 Squadron who failed to note General Becke's appointment in last week's "Gazette" will receive the news with genuine gratification.

FRANCE.

OFFICIAL COMMUNIQUÉS.

JAN. 23rd.—During yesterday one of our pilots brought down a German aeroplane, which fell in our lines near the Navarin Farm (in Champagne). In the region of Montmédy (north of Verdun) another German machine, which was attacked by one of our aeroplanes with a machine-gun at short range, fell to the ground in the enemy lines near Hamel.

During the morning enemy aeroplanes dropped five bombs on Montdidier.

A Fokker came down in our lines towards Fismes (midway between Soissons and Reims). Two German machines were brought down—one in an air fight in the neighbourhood of Marchélepot (north of Chaulnes), the other by our anti-aircraft guns near Amy (south of Roye).

JAN. 24th.—During yesterday Lt. Guynemer brought down his 26th German aeroplane, which fell in flames near Maurepas (on the Somme Front).

In the region of Verdun two other enemy machines were also brought down—one near Samogneux and the other in the Forest of Spincourt.

It is confirmed that on the 22nd a German aeroplane, which had been hit by one of our special guns, fell to the ground, and was dashed to pieces to the north of Louvemont (north of Verdun).

During the same day 16 British naval aeroplanes bombarded the blast furnaces of Burbach (Sarre basin), and apparently caused considerable damage to them.

One of our aeroplanes during the night of the 23rd dropped bombs on the railway station of Dun-sur-Meuse (north-west of Verdun). The northern part of the station was struck.

During the day a German aeroplane was brought down in the neighbourhood of Vaux-Cere (Aisne).

JAN. 25th.—Lieut. Guynemer yesterday brought down a second German aeroplane near the station of Chaulnes. This makes the 27th enemy machine accounted for by this pilot. Lieut. Heurteaux during the same day brought down his 17th enemy aeroplane, which fell to the ground and was dashed to pieces near Parvillers (south-west of Chaulnes, and both on the Somme front).

It is confirmed that Lt. Heurteaux on the 24th brought down in our lines near Lignières (west by south of Roye) his 18th German aeroplane.

It is confirmed that Lt. Heurteaux on the 24th brought down two enemy machines. The second of them fell to the ground 1,650 yards to the south of Rocquigny (east of Le Transloy). Lt. Heurteaux also accounted for an aeroplane yesterday. This makes the 19th machine brought down by this aviator up to the present.

A third and a fourth German aeroplane fell and were dashed to pieces as the result of encounters with our pilots. One dropped in our lines north of Altkirch (Alsace), and the other to the south of St. Etienne-à-Arne (Ardennes). It is also confirmed that an aeroplane, caught by one of our machines at short range with machine-gun fire on the 23rd, fell to the north of Craonne (north-west of Reims).

During the day of the 24th and the night of the 25th our bombarding squadrons carried out a number of operations. Two hundred and ten kilogrammes (about one-fifth of a ton) of projectiles were dropped on the railway station of Brieulles (north-west of Verdun), where a great fire was caused. The railway stations of St. Quentin and Voyennes (north-east of Nesle, Somme front), the huts at Liancourt Fosse (south of Chaulnes), the railway station and the huts at Guiscard (south-east of Nesle), the railway station of Tergnier (north-east of Chauny), and the military establishments to the south of Chauny were also plentifully bombarded.

A German aeroplane was brought down west of Barleux by our anti-aircraft guns.

JAN. 27th.—During yesterday our chasing air squadrons had numerous decisive fights, in which five enemy aeroplanes were brought down. Two of these machines fell in the region of Verdun—one to the north of Gincrey, and the other near Montfaucon (respectively north-east and north-west of Verdun). Two of the others fell near Trosly-Breuil (east of Compeigne), and near Carlepont (south of Noyon).

The fifth machine, attacked by Lt. Guynemer, was obliged to come down in our lines near Doullens (about 20 miles south-west of Arras). The aviators, who were made prisoners, confirmed that on the 25th an enemy machine attacked by Lt. Guynemer was, as a matter of fact, brought down by him near Goyencourt (north of Roye). These two fresh successes bring to 30 the number of German aeroplanes which this pilot has accounted for up to the present.

During the day of the 25th two of our aeroplanes bombarded the railway station and military workshops at Ham (on the Somme front). A fire and a big explosion were observed.

JAN. 28th.—In the region of Moulainville (east of Verdun) a German aeroplane was brought down by the fire of one of our special guns.

JAN. 29th.—Yesterday Lt. Gastin brought down in our lines a German aeroplane of the Albatros type. This is the fifth machine brought down by this pilot up to the present.

Last night our bombarding aeroplanes dropped bombs on the railway stations of Athies, Savy, and Etreillers (all in the vicinity of St. Quentin).

An enemy aeroplane was brought down by the fire of our artillery in the region of Danne Marie.

Bombs were dropped on the open town of Lunéville, but nobody was hurt.

* * *

A report from Paris, dated Jan. 29th, stated that General Lyautey, Minister of War, has decided to amalgamate the various departments of the Air Service, which will henceforth be grouped under one central authority in Paris, controlled by the Minister himself. General Guillemin has been selected for this important post.

Hitherto the aeronautic services within and without the war zone have been kept separate, with the inevitable result of loss of cohesion, the respective chiefs frequently standing for contradictory schools and methods. General Guillemin will have at his disposal civilian as well as military expert advice.

GERMANY.

OFFICIAL COMMUNIQUÉS.

JAN. 23rd.—FRONT OF CROWN PRINCE RUPPRECHT.—Elsewhere the mist, which almost continually prevailed, hampered the activity of our aviators and artillery.

A German Admiralty communiqué, dated Jan. 23rd, referring to the sea-fight off Zeebrugge, states that some German aeroplanes observed an enemy destroyer which appeared to be in a sinking condition.

JAN. 24th.—The favourable observation conditions were utilised by our aviators for their varied tasks.

As the result of numerous aerial fights and of fire from our anti-aircraft guns the enemy lost six aeroplanes.

JAN. 25th.—FRONT OF GERMAN CROWN PRINCE.—The clear weather favoured aerial activity on both sides.

RUSSIA.

OFFICIAL COMMUNIQUÉS.

JAN. 25th.—About 2 o'clock our artillery brought down an enemy aeroplane, which landed within our lines near the village of Smolno, west of the town of Brody in Galicia. During its fall the machine burst into flames in consequence of the petrol catching fire. The pilot and observer, who attempted to escape, were captured. We took two machine-guns from the machine.

JAN. 26th.—Hostile aeroplanes dropped bombs on the station of Radziviloff (near Brody), without causing any damage.

JAN. 28th.—On the same day one of our Farman aeroplanes, in charge of aviator Ensign Plugin and observer Staff-Capt. Kiseleff, returning from a reconnaissance, was attacked by a German battleplane, with which they engaged in combat. After some machine-gun firing our aeroplane caught fire and fell in the region of the River Shara, south-east of Baranovitchi, in front of our wire entanglements. The dead bodies of the pilot and observer were brought in the same day.

A German aeroplane dropped bombs on the station of Zamirie (north-east of Baranovitchi), on the Alexandrovskaia Railway.

AUSTRIA.

OFFICIAL COMMUNIQUÉ.

JAN. 26th.—One of our aviators on Jan. 23rd, near Kimpolung, shot down a Russian aeroplane in an air fight.

BELGIUM.

OFFICIAL COMMUNIQUÉ.

JAN. 28th.—The weather, which was cold, but clear, having again become favourable for aviation, our aviators were very active throughout the whole Front. Our aeroplanes effectually assisted our batteries, and pursued several enemy machines.

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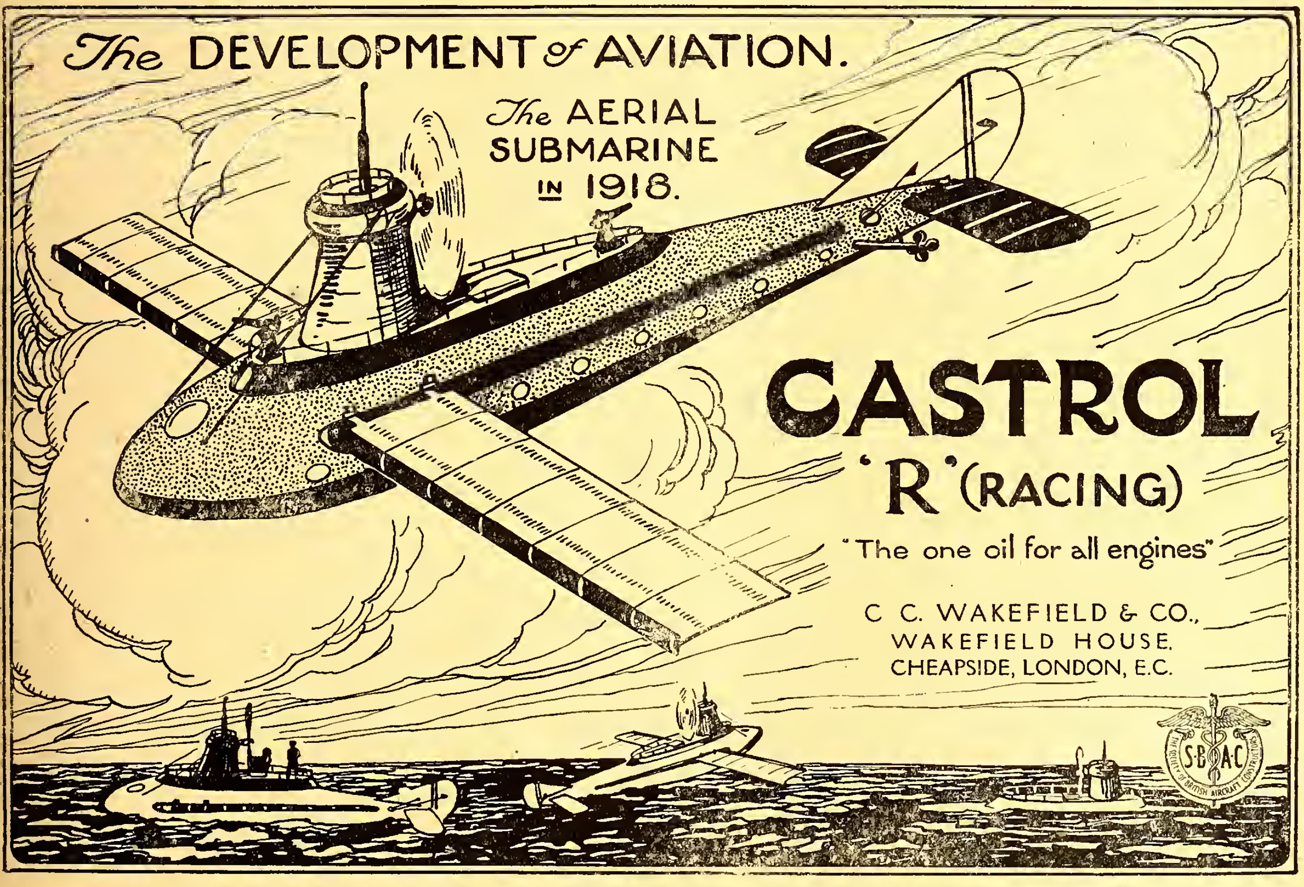

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The Inauguration of the Rejuvenated Aeronautical Society

If the Aeronautical Society can maintain in its future meetings the high level of interest aroused and displayed at its inaugural meeting, then, indeed, its rejuvenation is complete and its life to come is an assured success. The big lecture hall of the Institute of Civil Engineers, in George Street, Westminster, was packed long before Commodore Godfrey Paine, R.N., the Chairman of the meeting, and Brigadier-General Brancker, the lecturer, made their appearance, and never for a moment did the attention of the large audience wander.

To the old hands in aviation the meeting was particularly pleasant, for it reunited for the first time since war began a surprisingly large number of the pioneers of aviation, both in the Services and in the Aircraft Industry. A glance round the hall recalled memories of the earliest days of Leysdown, Eastchurch, Brooklands, Farnborough, and Lark Hill, before one had ever heard of such places as Hendon, Upavon, Netheravon, Montrose, Calshot, or Felixstowe, as centres of flying. Not the least gratifying thought was that so many of the earliest fliers are still with us to impart information to the younger generation of pilots.

Both the Services were largely represented, as was only natural with the leading officer of each Service on the platform, and one was glad to see that the Aircraft Industry was present in quantities, for not only were the heads of the leading firms there, but many of their employees also. It is hoped that the said heads of firms will arrange for still larger numbers of their staffs to attend future lectures on subjects more closely concerned with the design and construction of aircraft, though it is certain that no lecture to come can exceed in interest that delivered last Wednesday.

Apropos the Services and the Industry, a friend of the writer's came across an amusing instance of the utter inability of a certain type of commercial mind to grasp the idea of Service ranks. A member of the Aircraft Industry, and a somewhat early member at that, looking at a notice of the meeting just before the lecture began, remarked that there seemed to be a mistake therein. Pointing to the name of the distinguished Chairman, he said that he thought that Commodore Paine had been promoted to be a Captain ever so long ago. One suspects, and hopes, that the next step in rank for that officer is not very far distant, and it certainly is true that he was promoted Captain some few years back, but members of the Industry will do well to avoid confusing the title of Commodore with the rank of Commander.

Commodore Paine's introductory and valedictory remarks were typical of him. His words were brief, and very much to the point. One felt inclined to wonder how long it has been since General Brancker was told to "go on," in precisely the manner in which one used to be told to start construing at school.

General Brancker's lecture was also a revelation of his personality. One might have wondered how he was able to find time to prepare the lecture if one had not heard him deliver it, for the man who can crowd a two-hour lecture into a bare hour, though a terror to note-takers or shorthand writers, demonstrates his ability to do twice as much in a day as any ordinary person. Moreover, never once did he wander from his point, nor from his subject, nor from his line of argument. The various sections of his lecture were perfectly comprehensible to the meanest intelligence, and, despite his express delivery, one never missed a word through any fault in enunciation or slurring of phrases. He was as clear and distinct as a non-jamming machine-gun, and about as rapid.

One begins to understand better how and why the organisation of the R.F.C. is what it is, since one has heard the Director of Air Organisation discuss a small portion of his own job for the enlightenment of those who are concerned with Service flying, and one hopes that both junior officers and the Aircraft Industry will profit by the information thus available.

Opening Remarks by Major-General Ruck, C.B.

Before calling upon Commodore Paine to act as Chairman, General Ruck, the Chairman of the Society, gave a short account of recent progress. He said that in the opinion of the Council the time had now arrived when normal activities could be continued. Hence, this lecture, which was the first of a series which it was proposed to give on each alternate Wednesday for some months to come, the subjects being selected with the approval of the Naval and Military authorities. The programme would be published shortly, and the place of meeting would be the Lecture Theatre of the Society of Arts, John Street, Adelphi.

Some few months ago the British Aircraft Manufacturers associated themselves together to form the S.B.A.C., which now includes nearly, if not quite, all the firms engaged in the construction of aircraft. A series of joint meetings were held of the Council of the Aeronautical Society and of the Council of the S.B.A.C., and an agreement was drawn up defining exactly the spheres of the two societies, and establishing a Standing Joint Committee to advise in all matters where their mutual interests are concerned. This was, perhaps, the first occasion when a scientific society and a society of manufacturers had associated themselves in this manner. There had already been a satisfactory increase of membership due to this association, and the Council expected it to be largely augmented in the near future. This association would also help in the formation of local centres of the Society and students' sections, which had been one of the objects of the Council for several years past.

General Ruck regretted the resignation of Mr. Cooper from the secretaryship of the Society, but he had been called away for other duties. Mr. Cooper has been for some years secretary of the Society, and has aided greatly in its present financial position. He has been succeeded by Mr. Faraday. The satisfactory financial aspect is also due largely to the assistance of the War Office and Admiralty, which have done their utmost to promote the interests of the Society.

The Council are considering the removal of the Society's offices to larger premises in a more convenient neighbourhood. They also hoped to increase largely the lady membership. One lady, Lady Drogheda, had shown what can be done to further aeronautical progress, and he strongly advised anyone who had not already visited the Grosvenor Gallery to go there and examine the extraordinarily interesting collection which Lady Drogheda had gathered together with amazing energy, skill, and taste.

He was justified in saying that the Society was making very satisfactory progress, and, with the assistance of Government bodies and other aeronautical associations, they would develop out of all knowledge.

Commodore Godfrey Paine, C.B., M.V.O., R.N., the first Air Lord of the Admiralty, remarked briefly that how to fly was the beginning of the question. You cannot fly without aeroplanes, but if you cannot fly you cannot use them. He then exhorted General Brancker to "go on."

General Brancker's Lecture.

General Brancker said he was not going to talk about teaching flying, but about training in military aviation. He hoped to hear at the end of the lecture the Naval views, the ideas of the newly fledged pilot and pupil under instruction, and the opinions of designers and constructors. Although he had had a great deal to do with the training of pilots, most of his work had been on an office stool. He hoped he never would teach, but he had the advantage of visiting numerous aerodromes and hearing a vast number of conflicting opinions.

He had come to two very definite conclusions. One is, that we have a very great deal to learn still as to the best methods of training pilots, and the other is that it is almost impossible to get any two experienced pilots to agree on any one subject in connection with aviation.

Another interesting point is that the average pilot, especially after three months' experience, is intensely conservative, and usually self-opinionated, and thinks that the methods he is being brought up to must be the best, and he hates an innovation like poison. The training of all young animals has been a subject of great interest to him from his youth up, and the training of pilots is rendered still more interesting by the fact that a mistake may mean a bad smash or death.

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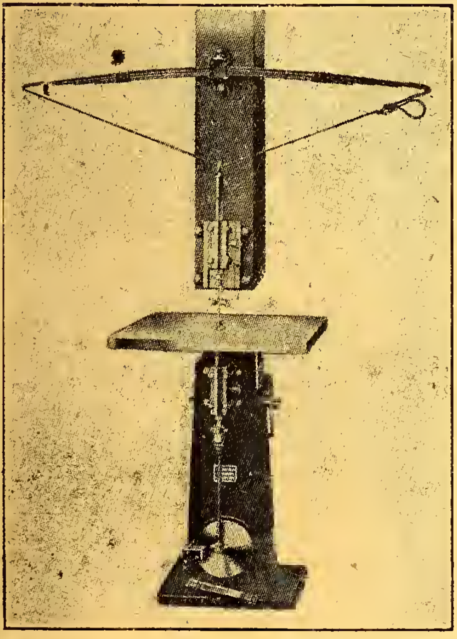

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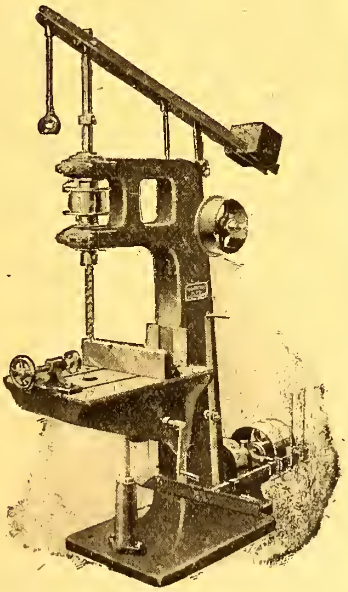

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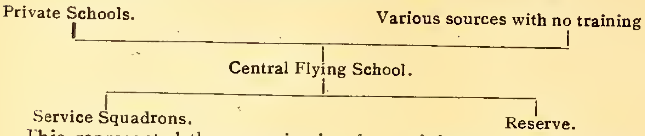
Before the war the system of training was as shown in the following diagram :—

TRAINING ORGANISATION IN PEACE.



This represented the organisation for training at the beginning of the war. Both Services depended almost entirely on the Central Flying School for their pilots.

In the Army, as a rule, officers joining the R.F.C. took the Aero Club's certificate at their own expense. This demanded a very low standard of efficiency, and was not of much value, and many instructors at the C.F.S. preferred pupils who had not been instructed at a private school before, and who had no bad habits to unlearn. This was not altogether the fault of the private school, but rather because the gratuity which Government allowed an officer who was accepted for the R.F.C. was not sufficiently large to ensure thorough training, and the standard for the certificate was so low that he believed pupils often qualified after about two hours in the air. One notorious politician had qualified between breakfast and lunch.

Some of the firms which ran schools said they ran at a loss merely as an advertisement, but he noticed that they demanded compensation when taken over by the Army at the outbreak of war.

At the C.F.S.

The Central Flying School, on the other hand, probably provided better instruction in aviation than any other similar institution in the world. The course lasted three months, but it was always recognised that this period ought to be extended to about six. But the size of the school was governed by the money available, and itself governed the output of pilots, which, even in peace, was not equal to the demands of the two Services. Military subjects were taught to some extent on the ground, but in those days, bomb-dropping, photography, wireless, and fighting in the air were scarcely mentioned.

Almost all pupils started in the Maurice Farman Flight, with dual control instruction. They then did solo work on the Maurice Farman. Thence they moved to an "advanced" flight, and were given dual control instruction either on Avros or B.E.2's, and so on, to solos on either type.

[There were very few machines fitted with dual controls before the war, and dual control instruction usually consisted in the instructor sitting behind the pupil and grasping the control stick, or wagging the pupil bodily by the shoulders.—Ed.]

The final test was a cross-country flight, in which a height of about 3,000 feet had to be reached, and a spiral landing made somewhere on the Upavon Aerodrome with the engine stopped. Reconnaissance height in those days was considered to be 3,500 to 4,000 feet, and it was only the exceptional pupil who reached anything higher.

The art of flying was taught as well as was possible, whereas the military side of aviation, as understood to-day, was not really included.

The Outbreak of War.

On the Declaration of War, all available resources were sent straight into the field, as it was thought that the war might last as much as six weeks, and the only unit left intact, so far as the Army was concerned, was the C.F.S. Even that was severely denuded, both of instructors and of aeroplanes, to bring the Service Squadrons up to fighting strength. Our Chairman was warned to part with his 18 best machines.—[General Brancker omitted to repeat what he said on that occasion.—Ed.]

Then came a very lean period in England, during which very few pilots were produced, for the simple reason that neither sufficient instructional aeroplanes or instructors were available.

[Which was just when the Civilian Schools might have been useful, if they had been encouraged. As it was, they trained a higher percentage of pilots than the military schools.—Ed.]

Some sort of policy became necessary. New squadrons, Reserve and Service, were, therefore, started at all existing stations as officers and material became available. New stations were also started in various parts of England for two reasons. First, it seemed that the most economical number of pupils, given unlimited aeroplanes, which could be trained on one aerodrome without undue congestion would be about 60. It was thought that one Reserve Squadron could properly train between 20 and 30 and that, therefore, the ideal station should accommodate from two to three squadrons, either Reserve or Service.

The second reason was, that it seemed a pity to have all one's eggs in the same basket. The wonderful English climate varies enormously in different parts of this comparatively small country, so that while the weather might be hopeless in London, the Midlands might be perfect, Yorkshire might be impossible, and flying might be in full progress in Scotland; it, therefore, seemed sound to scatter these aerodromes as much as possible.

Additional advantages were that the new aerodromes would form halting places for new machines coming from the contractors, and that this system would also ensure, as far as possible, that all the New Army training in England would see and have some knowledge of aviation, a point on which Lord Kitchener was very emphatic. The disadvantages were that available instructors were scattered instead of concentrated, and probably more instructors were required for a given number of pupils.

After two or three months of war, the system was as follows :—

The Central Flying School was turning out pilots who were usually absorbed in replacing casualties abroad.

There were a certain number of Reserve Squadrons at different stations in England from which Service Squadrons were built up out of nucleus flights taken from Reserve Squadrons, and broken off as they were completed.

Generally speaking, the Reserve Squadrons gave preliminary training on Maurice Farmans only; and as the pupils qualified they were sent on either to the C.F.S. or to a Service Squadron, where they completed their training.

A Difficult Period.

At this period the two great difficulties were : (1) A shortage of competent instructors, because the best pilots wanted to go abroad for honour and glory instead of training pupils—colloquially known as "Huns"—and (2) scarcity of aeroplanes and engines.

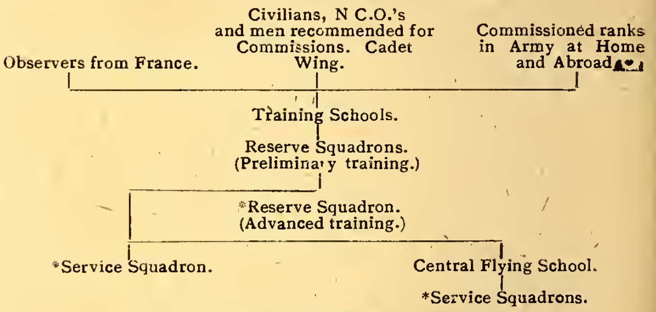
Lord Kitchener did his utmost to force on aviation, as he realised its immense importance, and he (General Brancker) recalled how Lord Kitchener desired 50 aeroplanes flying in proper formation to bombard Essen. A year later, as Lord Kitchener arrived at St. Omer, a squadron of 12 aeroplanes in formation flew overhead, whereupon he remarked, but with a humorous expression, "I told you to do that a year ago."

The experience of war taught that a pilot must do many things besides flying. First, wireless, photography, and bomb-dropping all came into vogue and demanded extra training. A little later fighting in the air started, and this involved instruction in aerial gymnastics and the use of machine-guns.

In the latter half of 1915 fighting in the air became a serious proposition, and the wastage grew much larger. The Fokker caused considerable disturbance in the British Press. And so in the winter of 1915-1916 the training of pilots had to be considerably forced and hastened in order to keep up with the demands.

The system described was steadily developed until it has now reached the organisation depicted in the diagram.

MODERN TRAINING ORGANISATION.


Observers from France.
Civilians, N C.O.'s and men recommended for Commissions. Cadet Wing.
Commissioned ranks in Army at Home and Abroad.
Training Schools.
Reserve Squadrons. (Preliminary training.)
*Reserve Squadron. (Advanced training.)
*Service Squadron.
Central Flying School.
*Service Squadrons.

* Includes a course at an Aerial Gunnery School.

Cadet Wings.

General Brancker then traced the career of a civilian who wishes to join the Royal Flying Corps now. He first joins the Service as a cadet and goes through a course in the Cadets' School, at which military subjects pure and simple are taught. He gets a grounding of drill and discipline, care of arms, interior economy, military law, and the use of the machine-gun.

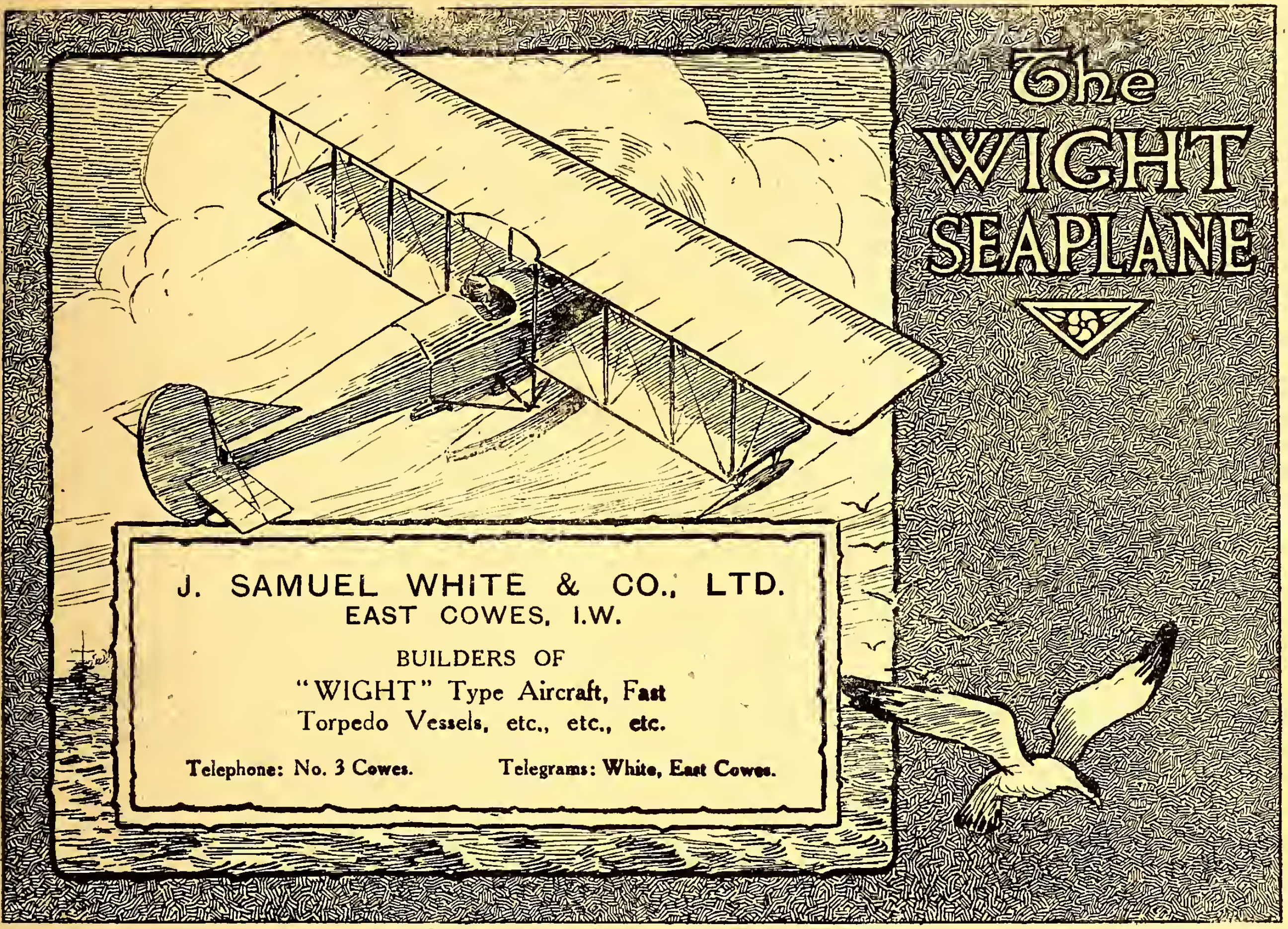
Thence, he is sent to a Flying Corps Training School, where he begins his technical training. He learns the care of engines and rigging, some idea of the theory of flight, wireless signalling and receiving, the care of machine-guns, the use of the camera, map reading, observation of artillery fire with models, and in spare moments he does drill. If he survives he is given a commission on the General List.

He then joins a Preliminary Training Squadron, and starts learning, usually on the Maurice Farman, his training both in military and technical subjects going on concurrently.

After reaching a certain standard of efficiency and after a certain number of hours in the air, he is sent to an Advanced Training Squadron or Service Squadron, where he learns to fly Service types of machines and eventually qualifies for his wings. He is then gazetted as a Flying Officer of the Royal Flying Corps and posted to a Service Squadron.

Exceptional pupils are sent to the C.F.S. for higher instruction on fighting scouts. During the period of advanced training they go through a course of aerial gunnery away from their squadron.

The total time in the air usually required to reach the qualification stage was stated by General Brancker, but it is perhaps wiser not to tell the Germans in print precisely the length of time that it takes to reach this standard, which depends entirely on the weather and the number of aeroplanes available. During the winter it works out at rather a long time, but in the summer it is considerably shorter.



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The War Standard.

War has forced a much higher standard of flying. The expert pilot has to be prepared to fly at the greatest height his machine will reach, which is something over 17,000ft. He has to dive, loop, side-slip, and tail-slide, to be an efficient fighter, and has to have considerable experience in photography, in observation of artillery fire, and the transmission of results by wireless, and in the use of the machine-gun. He must be an expert bomb-dropper, and, finally. in bombing raids, long reconnaissances, and in fighting patrols, it is necessary for aeroplanes to fly in fixed formation numbering anything from two to 20, an operation demanding a great deal of skill and experience.

There is only one thing which has simplified training during this two and a half years : modern aeroplane design and the latest engine make flying pure and simple much easier, compared with the days of the 28-h.p. Anzani-Blériot, which could only just drag its tail along. In those days machines needed "some flying."

Aerodromes.

Considering the requirements of training on a large scale, General Brancker said that there is no such thing as a perfect aerodrome, and even a possible one is very difficult to find in England without either interfering with somebody else's rights or involving much labour and waste of time, especially now that a new aerodrome is supposed to mean so many tons less wheat.

Personally, he believed that climatic conditions and a sound soil are the two most important factors in selecting an aerodrome. In England, however, climatic conditions are so unreliable that one can hardly say what part of England is best. The Pessimist and Optimist seem to take their weather with them, and will tell you that in the same place the weather is hopeless or ideal, according to their temperament. Curiously enough, the farthest north station—Montrose—has probably been favoured with better weather than any other.

If the aerodrome is not a very big one, open ground round it is of great importance, so that a pupil whose engine fails when leaving the aerodrome does not have to turn to land, but can go straight ahead and land outside.

Road communications are also important, for if a good aerodrome is at some distance from a good road, much time is spent in making a road to the aerodrome before the buildings can be started, otherwise one doesn't get there.

As to how many pupils or how many aeroplanes can be effectively and safely trained and used at one aerodrome, there is only a certain amount of room in the air, and everyone ought to be out in fine weather. An aerodrome, if possible, should be large enough to provide straights of about one mile in length in several directions.

Instructors.

As to instructors, he supposed that only about 10 per cent. of our flying officers are really good instructors, but by necessity we have employed practically every flight commander and flying officer in England, as an instructor at one time or other. The qualities required in an instructor are almost the same as the qualities required in a trainer of young horses—*infinite patience, great sympathy, good hands, and a clear, steady head.* Instruction in aviation is distinctly trying to the nerves. Flying on dual controls with unknown pupils is a test on the instructor's courage —a terrified pupil's iron grip is hard to overcome.—[Or, as a Naval instructor once put it, "An hour or so behind a pupil whose knuckle-bones are sticking out through the back of his hands with squeezing the sap out of the control wheel gets a bit feeding."—Ed.]—And the mental strain of watching endless pupils take their first solo flight, or waiting for them to get back from their first cross-country trips is very considerable. It is also hard to convince the good instructor that he is doing more useful work at home than in France.

Also the high standard of military training required is almost harder to teach to the ordinary human being than aviation. The pupil is less keen, and the instruction needs more brains.

School Aeroplanes.

Before the war, the general idea was that a beginner should be taught on the box-kite, and even to-day nearly all our pupils start their instruction on a Maurice Farman. Personally, he was opposed to this system, but had given way to the majority. The Maurice Farman is a very nice safe machine on which to get experience of dual control, although the control movements are different from almost any other machine.

The 80 Gnome Avro has, beyond the Maurice Farman, been our standby in advanced training, and is a thoroughly good machine for this purpose, light in handling, comparatively sensitive, and not too difficult to fly. Now, however, we have a new type, the first of which has just flown, which it is hoped will eventually eliminate the box-kite type of training machine altogether.

[One must not, presumably, describe it, but it is variously known as the "Clutching Hand," the "Sky-Hook," and the "Aerial Ford," and is the product of that versatile designer, Capt. Geoffrey de Havilland.—Ed.]

As regards stable machines for training, at first all the old conservative pilots shook their heads sadly, and said that you could never make a good pilot on a stable machine, and there are still many instructors who insist that a good pilot must be trained on an unstable machine before going on to a stable one, to make him careful. This seemed to him like teaching a man to ride on a horse which was liable to fall down. But, after all, *landing*, is the great thing, and stable machines are just as hard to land as unstable.

[Here speaks the voice of experience.—Ed.]

Personally, he believed that a pilot trained on stable machines. after about 30 hours' air experience, will have such knowledge of what a machine ought to do in the air that he will fly an unstable machine without even realising its instability, that is to say, of course, if he has been properly taught.

As to engines, through the demands of war, we have been forced to use obsolete engines for training. As a matter of fact, these obsolete engines ought not to be used for training, because they are more liable to failure than modern types, and engine failure is to be avoided in training. Limited output has precluded the manufacture in numbers of a special training engine, but now that obsolescent engines are of newer types, this difficulty will disappear.

Teaching Flying.

The best method of teaching flying is a most controversial point. During peace a good many pilots learned to fly by the light of Nature. They were just put into a machine and made to taxi about on the ground until they knew the controls, and then pushed off into the air, and left to take their chance—a thrilling moment both for themselves and their instructors.

Now he thought it is fairly well established that dual control is an absolute necessity. It gets the pupil into proper habits in the early stages of his training, and this he cannot really dispense with unless he is a heaven-born genius who takes to the air as a duck does to water, and there are certainly some men who seem to require no training at all.

Once off the ground and above any neighbouring obstacles, flying is easy unless the engine gives out, or you meet very bad weather. The whole difficulty is to land safely. The most critical moment of a pupil's education is his first solo flight. One of his own teachers always said that no one ever saw anything at all during his first two hours alone in the air. This was not quite true, but the feeling that you are up alone for the first time and have *got* to come down again is distinctly alarming, and he had known cases where pupils have simply looked straight to their front and flown for many miles in a dead straight line until their petrol was finished and they *had* to land!

The stereotyped method of starting instruction is on a Maurice Farman, with dual control, up and down "straights," gradually giving the pupil more and more control until he lands properly. After the first few solos on an easy type of machine, the pupil usually returns to dual control on a faster and more efficient machine—after many and wearisome circuits and landing with dual control, he is sent off on his first cross-country flight, another really thrilling experience. Before being allowed to do this, however, a pupil should be able to land within a marked chalk circle with his engine stopped from any height, and to have practised landing slowly over obstacles.

During this period of training one of the great bones of contention used to be the advisability of training a pupil to fly by means of his instruments as opposed to balance. Instruments used to be unreliable, but now, he thought that it was better to teach anyone, except an extraordinarily stupid man, with instruments.

He thought the day would come when an unstable machine will be looked upon as impossible.

Air Experience.

Another very interesting point is the value of air experience as a passenger before learning to fly His own experience was that this air experience was invaluable. The Chairman (Commodore Paine), however, always said that he (General Brancker) is one of the worst pilots he has ever seen, so he would not agree.

He used to believe that a large amount of passenger flying would almost teach a man to fly before he was asked to touch the controls, but he had been somewhat disappointed in actual results. A number of observers come home from France for instruction in flying, and many of these have 150 to 200 hours' air experience. They certainly do learn quicker than the man without air experience, as a rule, but the difference between them and their less experienced comrades is much less marked than he had expected. Certainly, experience seems to prove that four or five hours' experience as a passenger is advisable, and will probably hasten a pupil's progress in the early stages, but that any time beyond this is really not of much value.

He had had two observers from France, each with about 150 hours' experience, put into machines alone, and pushed off to see what they would do. One flew quite well at once, the other did a tail-slide, and had an appalling crash, fortunately without serious personal injury.

When once the ice is broken by the first few cross-country flights, the pupil soon begins to really *handle* his machine in the air, and to practise aerial gymnastics, such as steep spirals. loops, tail-slides, and so on. Then, slowly, the air habit begins to grow on the man, if he is ever going to be any good, and experience—and nothing else—makes it possible to land almost any-

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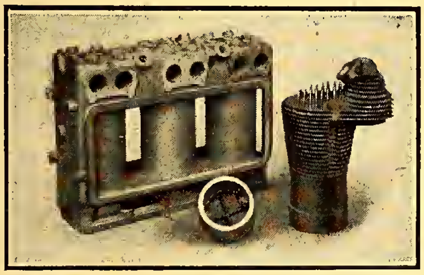

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where in a bad country with the engine stopped dead, and to drop down faultlessly onto a strange landing-place, without any indication of the direction of the wind, or the slope of the ground, and to manœuvre round and over storms, and find his way regardless of weather.

As the pupil goes on, the best form of training is to force him to fly in really bad weather. There is nothing which gives so much confidence as a successful bout with a nasty day. Fog and very heavy rain are the two really undefeatable factors in aviation.

The war has taught us to laugh at weather. It is only four years ago that "bumps" were looked upon with the deepest reverence and respect, and there were certain crossings over the rivers and hills around Salisbury Plain which were usually avoided except by the boldest. To-day, however, no one ever thinks of them, and, yet, almost exactly the same machines are being used for preliminary training as were being used then. It is a very good example of the wonderful growth of confidence in the last few years, which has done much to push on the progress of aviation.—[One begs respectfully to differ. Try a 50-h.p. boxkite, or a 70-h.p. "long-horn" Maurice, or a 50-h.p. 2-seater Avro over those same "bumps," as against an 80-h.p. streamlined "short-horn" Maurice, or an 80-h.p. Avro, and experience the difference in machines in the last two years, let alone four.—Ed.]

On the whole, flying itself is so easy that pupils suffer from over-confidence. Careful teaching is essential and very careful instructions as to the best method of meeting any emergency, such as a spin or a nose-dive, and it is only quite lately that we have had any authoritative statements as to how to compete with these situations, and, even now, there are probably people who differ as to the best course to follow if you find yourself nose-diving out of a cloud.

Technical Training.

The first portion of technical training is the care of engines, rigging of aeroplanes, the use of the compass, the use of instruments and other such details. This is carried out at the Schools of Military Aeronautics. Thus, a pupil before he learns to fly has some real knowledge of his engine, his machine, and its instruments. He then goes on to preliminary and advanced training squadrons, and continues to learn by practical experience both in the air and in the squadron shops.

A very debatable point is whether reserve squadrons should train pupils all through, i.e., from the very start up to the time they get their wings, or whether they should do preliminary training with one reserve squadron, and go on to higher training in another. There are certain arguments for and against both systems, but we have adopted the second. The greatest argument in favour of the first system is that the one instructor can take a pupil and really get to know him and follow him right through his training.

Military training on the ground is carried out at the schools of military aeronautics, where the pupil learns the use and care of the machine-gun, wireless, artillery observation, photography, and bomb-dropping, and this training he completes from practical experience when he gets onto flying instruction.

In the advanced training squadrons he begins to fly in formations and to drop bombs or their equivalent at a target. He carries out practical artillery observation by means of "powder puffs" on the ground which represent the bursting of shells, and he is sent out across country to photograph various points in the neighbourhood, and until he has proved himself efficient in all these operations he cannot be a qualified pilot. Fighting in the air is also practised by various methods; two machines may be sent up to manœuvre against one another, both trying to attack, or the pupil may be sent up whilst the instructor tries to attack him, or *vice versa*, or the instructor may go out and attack pupils returning from a cross-country flight, and so on.

Artillery Observation.

Every station in England now has an accurate model of a stretch of country laid out on the ground on which are shown trenches, gun positions, woods, rivers, railways, roads, and villages. Above the model is suspended a fuselage in which the pupil is seated and armed with his map of the country below him, his notebook, and a wireless transmitter, and there he goes through the whole process of observing gun-fire. The observation of the pilot can of course be checked afterwards by comparing his messages with the actual results with regard to the target. [General Brancker described the process with much interesting detail, which one omits in view of the fact that certain copies of this paper which go abroad inevitably fall into enemy hands.—Ed.]

Bomb-Dropping.

Soon after the war started an ingenious device which is termed the camera obscura was developed. An aeroplane flying approximately over this camera obscura throws an image, and the observers, by following the course of the aeroplane, can tell exactly how far from being directly over the camera obscura the pilot may be. If the pilot gives a signal at the point at which he considers he ought to drop a bomb to hit the camera obscura, the observer can work out quite accurately the error of the pilot.

This apparatus has proved of enormous value, not only in teaching bomb-dropping, but in improving the pilot in the actual handling of his machine. [Again, details of much interest are omitted.—Ed.]

Fighting in the Air.

We now have a gun which takes photographs, and aerial battles in which one aeroplane endeavours to catch and photograph another are of daily occurrence.

In addition to this a school of aerial gunnery is developing, in which practice from the air takes place against every sort of target. Targets are now towed by aeroplanes without any danger or difficulty, and these are used for actually counting the hits made from an aeroplane in the air. [One hopes that some intelligent Hun will try the trick of towing targets, and get himself wrapped up in the tow-rope.—Ed.]

Peace Flying and Training.

Military flying is getting more and more complicated, but flying from one place to another has become very easy and comparatively safe, and therefore in peace everyone who can should take it up as a means of travel and a means of recreation.

The great factor against aviation for such purposes is our uncertain climate, but with experience and with reliable engines it is possible to fly in almost any weather short of a thick fog, a hurricane, or a violent thunderstorm. All these can be avoided by skill in navigation and a certain amount of weather wisdom.

General Brancker said that he is always racking his brains for possible improvements in our system of training. The only improvements he could think of at the moment are better qualified instructors and more of them, more reliable engines, and slower and more deliberate training, possibly including handling of the controls in an apparatus on the ground which will respond in much the same way as an aeroplane would in the air. [For instance, the old Antoinette "rocking-horse" of 1909, and the mechanisms built in 1910 or so by the late Mr. Eardley Billing at Brooklands, and by "Captain" Sanders at Beccles? These were and still are worth developing.—Ed.]

Qualities of Pilots.

The most unexpected people make good pilots, and for this reason it has always seemed undesirable to lay down a stereotyped process of training. Personally, he thought that any sound man with sound nerves (and women too, for that matter) can make a good pilot, but it is only the exceptional individual who will make the really brilliant fighting pilot. Even the unsound can fly well; we have deaf people, some partially blind, and people with wooden legs, like the late Lord Lucas. [That being so, one commends to the R.F.C. authorities a more intelligent and less absolutely rigid medical examination.—Ed.]

There is no doubt that the best age to learn is as young as possible, just as a boy easily learns to ride, but during war this is impossible, as the pupils would be too young to fight. They take a few below the age of 18 now, but generally 18 is rather young for the great strain of active service, and he preferred the man of 20 to 25.

A man of between 35 and 40 who has lived a hard life and is a good horseman will probably turn into a good pilot quicker than the man of from 25 to 30 who has spent his life in an office or doing nothing, but as a rule the older man will not stand the strain of fighting as long as the young man, though better for artillery observation and long reconnaissances. Promotion is rapid in the Flying Corps, but some men become too old to fly and are too young for anything else. There was a time when 35 was regarded among pilots as doddering old age.

The quality of horsemanship is quite a useful one in any would-be pilot. The requirements are just the same, good hands, a good head, steady nerves, and judgment. Flying is perhaps a little easier than riding, because you sit in a comfortable armchair in a quiet machine instead of on a slippery saddle on a fractious horse.

Much depends on the temperament of each man, and the ideal in training would be to teach every pupil differently, just as every young horse wants different handling. The bold require holding back and the timid pushing on. The fast learners want careful watching and the slow learners need infinite patience; experience shows that an almost equal number of good pilots are produced from each of these categories.

German versus British Customs.

A point of interest is the relative status of pilot and passenger. The Germans have a certain number of officer pilots, but a good many N.C.Os. Their observers are all officers, and are supposed to take charge when in the air. He thought that their observers very seldom became trained pilots. In the R.F.C. almost all pilots are officers—the N.C.Os. very soon get commissions if they do well—and the observers, though officers as a rule, are absolutely under the control of the pilot. Observers after successful work in that capacity are allowed to learn to fly, and usually make good pilots. Two completely opposite theories, of which he thought ours has proved to be the best.

There are certainly cases where German N.C.O. pilots have shown cowardice, and the officer observer has been unable to control them. Anyway, we go on with our system, and it works well, its only drawback being that we lose our observers just as they are getting really experienced—but experience often brings tiredness and caution.

Danger in Training.

During peace the first consideration was to avoid accidents. Since the war started we take far greater risks. In spite of this,

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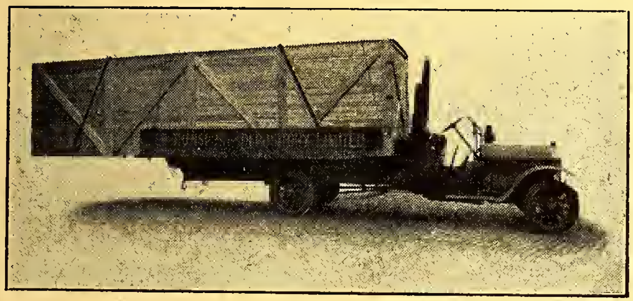

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the percentage of accidents has not really risen appreciably, and when you compare the number of deaths with the very large number of pupils in training and the very large number of hours in the air accomplished every day, the price is not great, and in the present stage of aviation the fact must be fearlessly accepted that no progress can be made without a certain cost in human life.

There is one very satisfactory feature in looking back through the accidents since the beginning of the war—there have been extraordinarily few cases of breakage in the air, which speaks very well for British construction and inspection. The most common type of accident is engine failure, followed by an effort to turn sharply into a possible landing place, and losing speed on the turn, which results in a nose-dive and serious smash. Even good and experienced pilots are prone to do this, and to him the only cure appears to be the avoidance of engine failure. This will assuredly come in peace, when we can develop more real reliability in the engine instead of extreme lightness and exaggerated performances.

The Future.

As an officer who has been responsible for training in the War Office now for four years, he felt that he had been wonderfully lucky in having the finest material in the world to work on, both for instructors and pupils. The Englishman may be conservative, but he is certainly the finest pilot in the world. The value of all the old British characteristics which made us masters of the *sea* is intensified in the *air*, and they will make us masters of the air yet, in spite of our politics and our system of government, and all the many obstructions to progress which will assuredly spring up as soon as peace is declared.

War has been the making of British aviation, and we must look to it that we preserve and develop the fruits of the war so far as aviation is concerned.

The Discussion.

Lt. Jullerot (attd. R.N.A.S.)—one of the earliest French pilots, and an instructor at the Bristol School, who trained many of our best pilots, including General Brancker—said that he believed in dual control Maurice Farmans for early training, but tractor machines as soon as possible, as they were more like the machines used for fighting purposes. He was dead against instruments at first, because the pupil looked at the instruments the whole time, and they were very often wrong. It was better to learn the "feel of the air," and instruments should not be used until the pupil could fly properly without them. If they were used it was better not to look at them. After seven years of flying, he had now started using instruments, and he often found them wrong.

Dual control was a necessity at the present time, as we have no time now to risk the other method. Dual control, with the seats side by side, would be the ideal type of teaching machine. The old side-by-side Bristol monoplane had given very good results. It was better to put the pupil in a tandem machine in the seat usually occupied by the pilot, as, then, he did not feel strange when alone.

Pilots were better if young, unmarried, unengaged—if possible—and they should have good hands and a good heart. Short sight was not a bad thing, as it prevented people from seeing too much.

Major Smith-Barry, R.F.C., said he would like to see dual control carried out more fully, the pupil not allowed to leave the ground alone until he had piloted from the driver's seat, and had made 30 or 40 landings without accident, then, when alone, the only control removed would be the moral effect. There would be an economy of machines in this, as only one type of machine would be required, and he thought six hours on one type with this method of teaching would be sufficient.

He also thought there should be a corps of instructors, specialists who did nothing else, paid rather more than less compared with other people. They should be judged by the number of smashes, and held responsible for them, and there should be no smashes except those due to engine failure. Teaching is now chiefly done by men home from France, resting, or waiting to go abroad, who have not the interest in the work they should have. Where there are two machines of a type, a two-seater and a scout, as in the Nieuport, it would be well if pupils were trained on the two-seater, and then put into the scout of the same type.

Mr. A. V. Roe said it would be better for the instructor to be in front, so that the pupil could watch his movements.

Mr. Gordon England agreed that the side-by-side machine had great possibilities, as years ago in this type he had found it possible to give verbal instructions to pupils in the air, and with some pupils, who forgot everything they had been told on the ground, this was an enormous advantage.

The instructor should be able to cut out and regain control. A perfectly positive mechanism of this type should be possible.

[An excellent system, worked by Bowden wires, has been patented, and should have been in general use months ago.—Ed.]

He thought pupils should not have instruments, that it was better for them to learn to fly on sense alone, and not to glue their eyes on speed indicators.

Wing Commander Longmore, R.N., recalled the fact that the Chairman, Commodore Paine, had learned on a single control machine some five years ago. About six weeks ago he had taught a Lieutenant on the Staff on a dual control "pusher," in which he, as instructor, was in a good strategic position to talk to the pupil, and, if necessary, to bash him on the head.

He might be old-fashioned, but he thought the pusher machine would give better results than the tractor, even though the pusher were bigger to house, and harder to keep in trim. The pupil could afterwards go to a dual-control tractor, and later spend much time alone in a moderately powerful tractor before going to a scout school, where they would only use and fly scouts, beginning with an 80-h.p. Bristol.

Seaplane instruction should be very much the same, but pupils must be taught to "pancake."

As regards instruments, he agreed with Lieut. Jullerot and Mr. Gordon England. He got into a machine the other day with a speed indicator 20 knots "fast." A youngster would have stalled and crashed.

With reference to crowded aerodromes, he agreed with General Brancker, only he would put the maximum number per school at 100. The air becomes very thick if there are a greater number per two square miles on a cloudy day and mostly flying at 2,000 feet or 1,500 feet.

General Brancker, in reply, said he still believed in instruments, which should be as well looked after as engines. The idea of the side-by-side two-seater appeared to him in rather a new light, but it must be remembered that at present they could only use obsolescent Service machines for teaching. Major Smith-Barry's was an ideal scheme, but it was not possible in war. Personally, he broke all rules as to age, eyesight, and other qualifications.

Mr. White-Smith, chairman of the S.B.A.C., and general manager of the Bristol Co., proposing a vote of thanks to General Brancker for his enjoyable and brilliant lecture, referred to the alliance between the Aeronautical Society and the S.B.A.C. General Brancker had given them many useful side-lights on war-flying. He referred also to the fact that General Brancker was the first British officer to fly in India, when he carried out tests by order of Sir Douglas Haig.—[Incidentally, on a 50-h.p. Bristol box-kite in 1911, piloted by M. Jullerot over impenetrable jungle, where a crash would have been most unpleasant.—Ed.]

Lieut.-Col. O'Gorman proposed a vote of thanks to Commodore Paine, for taking the chair, in terms which his Air-Lordship declared made him blush.

Among the many distinguished visitors were the Countess of Drogheda, Lieut.-General Furse, C.B., Master-General of the Ordnance, Dr. Glazebrook of the N.P.L., and Professor Whitehead, F.R.S.

The Airship Point of View.

The following are excerpts from notes communicated to the Aeronautical Society after the lecture by Lt.-Col. Clive Waterlow, R.E., Wing-Commander, R.N.A.S., Airship Section, and one of the pioneers of British airships:—

There are certain aspects of aeroplane training in which assistance may be sought from lighter-than-air craft. The first use is in teaching map-reading. Many young officers find it very difficult to read a map while in the air. Direct tuition in the air from an aeroplane is difficult, because the instructor and pupil cannot converse easily and cannot look over the same map. Also, necessarily, the instructor can only take one pupil at a time.

These difficulties can be all obviated in a free balloon. The instructor can then have a class of five or six pupils under ideal conditions continually passing over new country. R.N.A.S. aeroplane observers have received tuition in this way for some time back, and the results have been very satisfactory.

The second use is observation of fire. General Brancker referred to the use of a scale model of trenches fitted for training in observation of fire. This could be advantageously extended by the use of the kite-balloon. Kite-balloon observers in the R.N.A.S., and possibly in the R.F.C., are taught observation of fire under conditions resembling the actual thing as nearly as possible. They are actually in the air, a real target is given them, puffs are exploded in the neighbourhood of the target at irregular intervals, and they have to telephone the result to the ground. Such a system of training should be of value to the aeroplane observer.

The third use is in connection with navigation. This is perhaps more especially applicable to Naval aeroplane and seaplane pilots than to Army ones. Navigation from an aeroplane is at best by no means easy; the subject is not popular, and the majority of young officers look upon it as a waste of time, and prefer to trust to the easier method of finding their way by the lay of the land. For anyone flying over the sea, it is, however, essential, and it would not be difficult to cite cases where accidents and deaths have occurred both in the airship and aeroplane services due to the lack of knowledge of navigation.

The subject is a dry one to teach on the ground, and almost impracticable to teach in the air in the confined space of an aeroplane. In the R.N.A.S. this subject can be taught to airship pilots from a large old-pattern airship, with immense advantages. Four or six officers could be taught simultaneously, the various methods and processes can be actually demonstrated under real conditions, and the pupils can be exercised under the instructor's eye.

Other uses of lighter-than-air craft for training may occur, but those given above are all under actual trial, and promise well.

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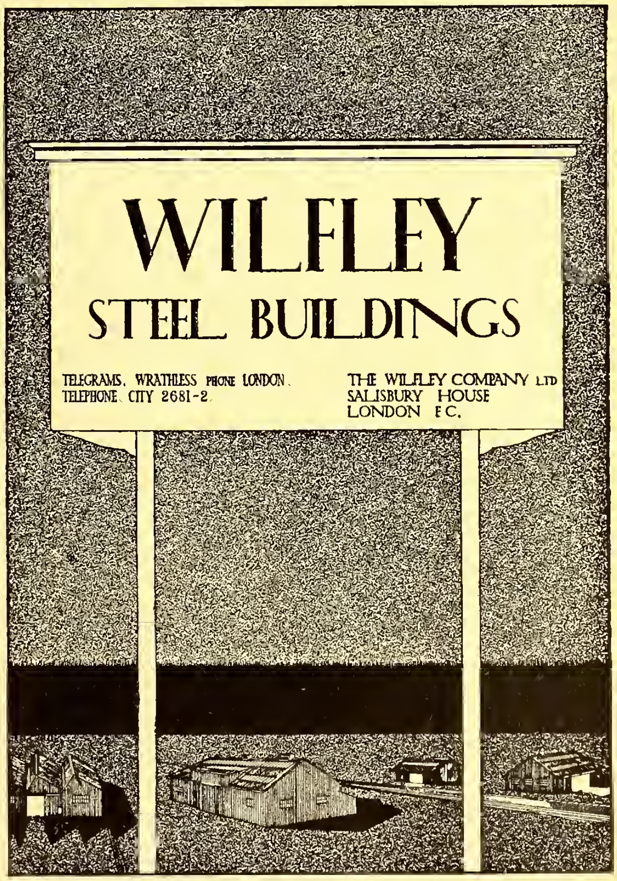

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AN INTERESTING VISITOR.

Quite one of the most interesting people who have visited the offices of The Aeroplane for some time is Miss Ruth Law, the American *aviatrice*, who pleads guilty to having flown from Chicago to New York, to having done close on 600 miles of the trip in one non-stop flight—performances duly chronicled in this paper at the time—and to having reached nearly 13,000 feet vertically.

None would accuse Miss Law on sight of such strenuosity, but in these days of women munitioneers, and agriculturalesses, and conductorettes, one never knows what women will do; and, after all, if someone had provided her with a decent machine at the time, one is inclined to think that Mrs. Buller would have taken the shine out of most British pilots a year or two before the war, just as Miss Law has wiped the eye of the American star turns.

Anyhow, Miss Law is to be congratulated on upholding the contrariness of her sex so capably, for in appearance she is far from one's usual idea of the man-beating female, being small, fair, and slim, and she gives one to believe for once a statement in a daily paper—namely, that which alleged that, in her opinion, "flying is good for the complexion."

Miss Law's reason for braving a January Atlantic, together with Hun commerce-raiders, submarines, and mines, not to mention English weather and Runciman menus, is a desire to acquire a British aeroplane with which to win the Trans-Continental Race from San Francisco to New York in June next. Carlstrom is the Curtiss chief pilot, and Miss Law has ambitions beyond being the Curtiss "second string," so she prefers to fly as an independent pilot.

Someone who ought to know better, or who ought not to know so much, has been talking in the States about "Sopwith pups," and other of our more fearful wild-fowl, and has been telling of speeds unimagined in America, or apparently elsewhere, so Miss Law has come over to see whether she cannot buy something of the sort.

It seems unlikely that our official people will permit so valuable a thing as one of our latest and fastest war machines to go to America, even for the sake of levelling up the rate of exchange with New York or giving our representatives across the Atlantic the necessary "rake-off." It is just possible, however, that the sporting nature of the deal might appeal to someone in authority, who might permit some reputable firm to export a pure racing machine of no war value, especially if, as was the case with some firms, a goodly proportion of their hands and material happens to be employed in the fabrication of aeroplanes which are useless for war, school-work, or peace flying, and destined only to be burnt, left to rot, or purposely crashed at the first opportunity. Admiralty contractors should be particularly interested in the proposition.

The engine difficulty is greater, seeing that all our engines are fairly good, and so are wanted here—except the R.A.F., which, being a secret product known to everyone but ourselves, could not be exported in any case, even if anyone were foolish enough to want it. There is, however, one believes, quite a good engine called the Hispano-Suiza, built at Barcelona, which might suit Miss Law's purpose, failing any type built in France, Britain, or Germany, and doubtless a single one, plus spares, could be delivered from one neutral country to another.

There is no doubt that we *could* supply what this sporting lady wants in the way of an aeroplane, and that we could do it without giving away military secrets or interfering with output, but it does not seem likely that she will be allowed officially to have it. However, one wishes her luck in her quest, in the race itself, and in her subsequent flying.

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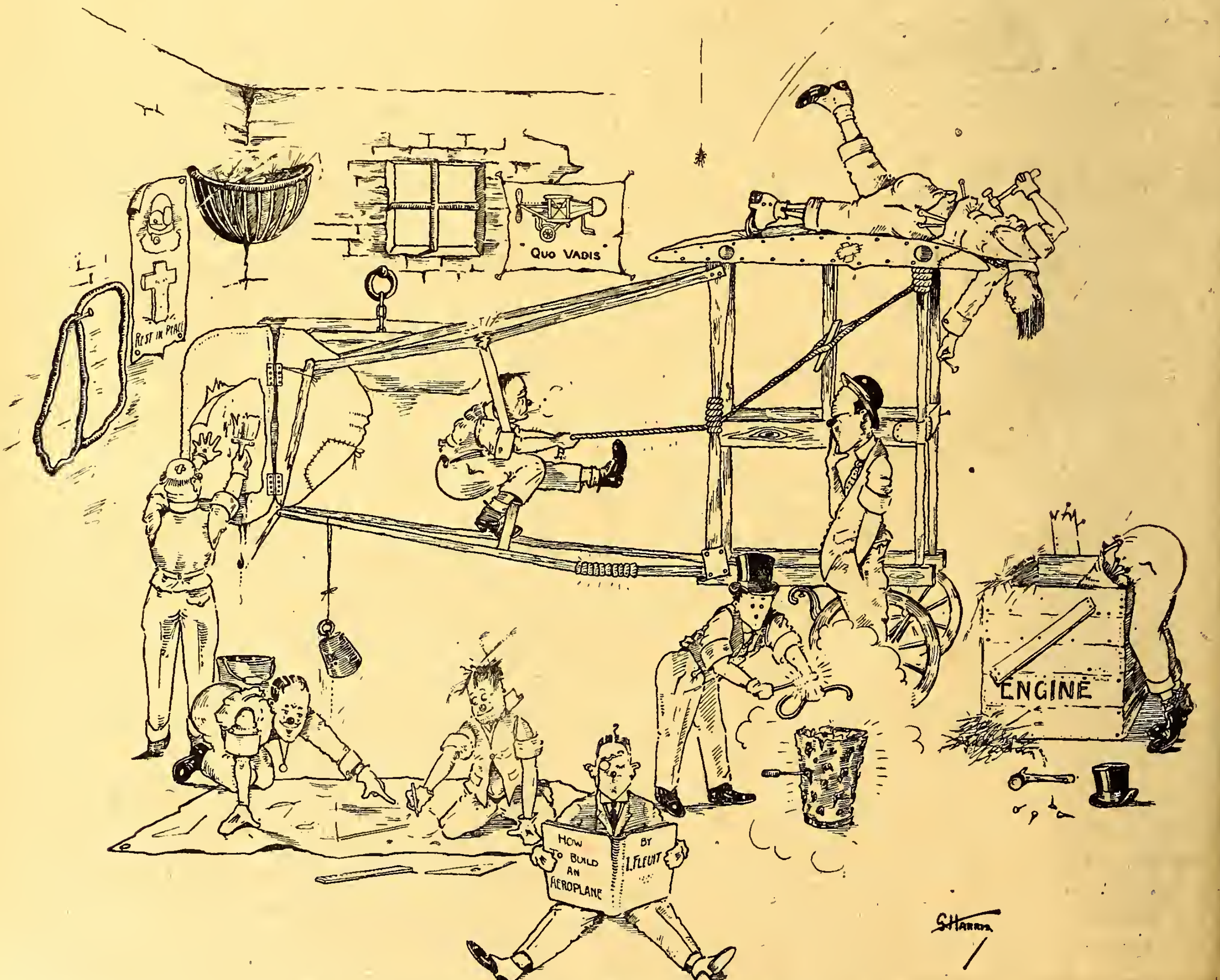

SCENES IN AN AIRCRAFT FACTORY.—III. Before the war,—when, it may be noted, the experimenters were gentlemen (vide the top-hats), or lunatics (vide the designer).

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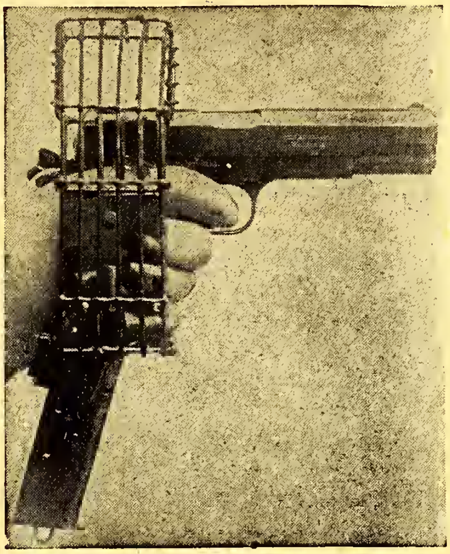

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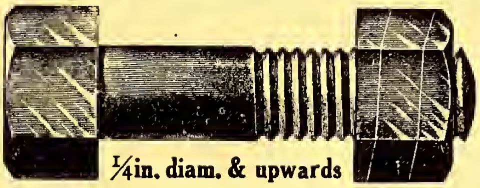

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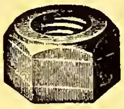

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ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of THE AEROPLANE. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

READERS BY THE HUNDRED.—If you want any information about joining the R.F.C., write to the Director of Military Aeronautics, Adastral House, Blackfriars, E.C.

If you want any information about joining the R.N.A.S., write to the Air Department, the Admiralty, Whitehall, S.W.

Men in the Army and ratings in the Navy can only obtain commissions in their own branches or transfers to other branches by permission of their immediate commanding officers, who must forward those applications through the proper official channels.

Civilian applicants for commissions in the R.F.C. enter through the Cadet Wings, and are trained to fly at the Government's expense, *vide* General Brancker's lecture.

Applicants for commissions in the R.N.A.S. enter as Probationary Flight Officers, and are trained at the Government's expense.

If you are blind or partially blind, or have to wear glasses for any reason, you cannot now become a Naval or Military aviator.

If you have had special technical training, are over 35 years of age, and attain the necessary social standard, which is not high, you may with luck become a Stores Officer R.N.A.S., or an Equipment Officer R.F.C., even if your sight is defective and you are physically deficient in other respects.

Information concerning appointments as viewers or examiners or inspectors in the Aeronautical Inspection Department may be obtained from the Chief Inspector, A.I.D., Adastral House, Blackfriars, E.C.

Observation of the points indicated above will save a great deal of unnecessary correspondence at the Admiralty, at Adastral House, and at this office, as there is no need to write letters on any point already explained above. The Editor is always pleased to answer questions or explain any points not understood by readers, but space in THE AEROPLANE is valuable, and the same question cannot be answered over and over again week after week. Consequently readers are requested, when asking questions, to make quite sure that the same questions have not been answered a week or so before.

J. W. W. (Addlestone).—The best qualification for a works manager is that he should be able to manage a works. The next best qualification is that he should be a son or some other relative of the managing director.

Actually, to be a works manager a man should have quite a good deal of general engineering experience, and should have an intimate knowledge of the various processes of manufacture in vogue in his own particular industry. He should also have the natural ability to handle men, otherwise he will never make a successful works manager. On the other hand, a man who can handle men, and especially has the gift of recognising a man who knows his job when he sees one, may make a very successful works manager without knowing anything at all about the particular job on which his factory is engaged.

No particular knowledge of book-keeping is necessary, because a works manager pays a human machine a few shillings a week for doing all such work. A knowledge of French is helpful in any business, especially when one wants to use lurid language in a shop full of women.

A knowledge of the production of metal parts and of engineering fitting generally is more valuable than a knowledge of the art of wood-butchery. As a rule, a works manager arrives at his position after having risen from bench hand to charge hand, from charge hand to foreman, from foreman to shop manager, and from shop manager to section manager. On the other hand, he

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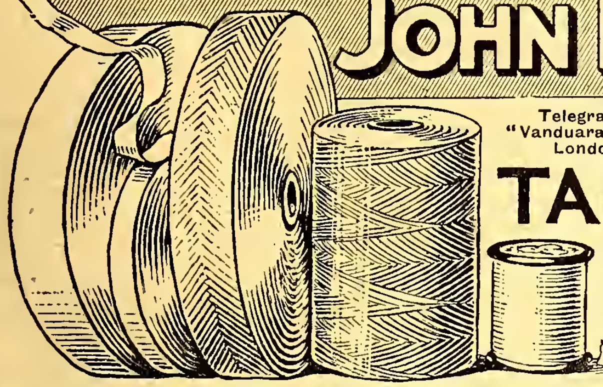

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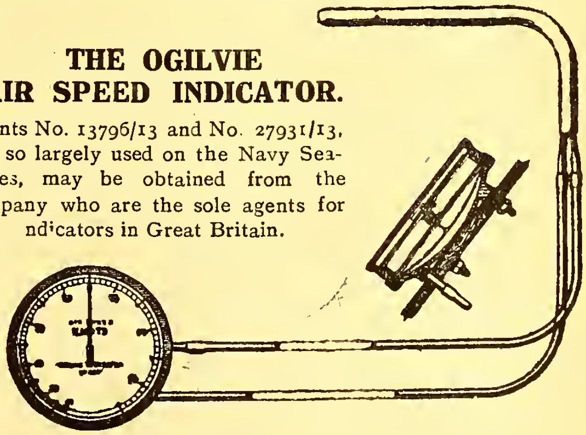

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may come from America with a paper reputation, and disorganise everything.

F. C. (Mill Hill).—Owing to the shortage of labour and the difficulty of procuring an unlimited supply of art paper, it has been decided not to print special art copies of the supplements which appeared in the Naval and Military numbers of The Aeroplane this year.

C. S. B. C. (Finsbury).—Mr. Herbert Strang's "Air Scout" seems to be like some other "air pilots" whom one reads on occasion when one has nothing to do, that is, if one is to judge from the accuracy of his technicalities. The description of a "rotary engine of the Gnome type, 7 cylinders, 1,000 revs. per minute, 100 lbs. in weight, and giving 100 h.p.," seems to be a trifle inaccurate, unless, of course, Mr. Strang has invented on paper some perfectly wonderful new mechanism.

The monosoupape Gnome, which is about the lightest thing of its kind, has 9 cylinders. It runs at about 1,200 r.p.m., and its weight, as you say, is much nearer 400 than 100 lbs. for its 100 h.p. Possibly Mr. Strang merely means that this wonderful engine was of a type similar to the Gnome, but if he referred to an actual Gnome engine, the description reminds one of that by a candidate in an exam., who defined a crab as a "red fish which walks backwards," a piece of natural history which was criticised by the examiner as being perfectly accurate but for the facts that a crab is not red, is not a fish, and does not walk backwards.

H. H. (Boston).—Unfortunately it is quite impossible for us to compare the various points of aeroplanes which are being used on active service, as this would be giving information to the enemy. As a matter of fact, the two machines you speak of are utterly dissimilar in everything except that they are both pusher biplanes.

I do not know whether the "Conquest of the Air," by J. Alexander, is still on sale or not. Communications relating to all publications should be addressed to The Aeroplane's publishing department, which is managed by the Wm. Dawson Publishing Co., Ltd., Rolls House, Breams Buildings, Chancery Lane, E.C.

Back numbers of The Aeroplane can also be obtained from the Wm. Dawson Publishing Co.

The cheapest way to obtain a set of the "Milestones" which appeared some time ago on the cover of The Aeroplane is to buy a copy of Captain Barber's book, "The Aeroplane Speaks." In this appears an almost complete set of the "Milestones" printed on art paper. The price of the book is 6s., post free, and it can be obtained from the Wm. Dawson Publishing Co.

G. M. R. (Mill Hill).—All the civilian schools at Hendon are now under Military supervision with the exception of the Hall School, and the former schools now only train candidates for the R.F.C. British civilians can still go to the Hall School.

C. W. P. (Willaston).—Temporary commissions in the R.N.A.S. can be obtained for the duration of the war. Application should be made to the Air Department, The Admiralty, Whitehall, S.W., for appointment as Probationary Flight Officer. Likely candidates are trained to fly at the Government's expense, and on completion of the instruction course are made Flight Sub-Lieutenants, R.N.

Previous practical mechanical experience is not required, although a generally intelligent knowledge of internal combustion engines and so forth is a recommendation. A Civil Service education should be good enough to pass you in this respect.

C. J. G. (Croydon).—It is quite impossible to advise you how to obtain employment in an aircraft factory without knowing more about your previous experience, unless, of course, you are prepared to do ordinary labourer's work.

Your best course would be to write round to one or two aircraft firms near London and ask whether they can give you work of any kind. You should, of course, state your previous experience.

E. A. H. P. (Mitcham).—I certainly never heard of anyone looping the loop in the manner you indicate, namely with the upper part of the machine outwards. There was a trick called the "S dive," in which the pilot stuck his nose right down and turned over on his back, but he always came right side up by depressing the nose once more and coming out with a dive.

As a matter of fact, if it were possible to do a loop with the pilot outwards he would probably be slung out of the machine by centrifugal force, and even if he were strapped in there would be a danger of the straps pulling away. Mr. Winchester appears to have flown to a fair extent, but he is evidently not very familiar with the phenomena of looping.

J. M. (Newgate Street, E.C.).—The address of the Society of British Aircraft Constructors is St. Stephen's House, Victoria Embankment, London, W.C., and the secretary is Mr. C. V. Allen.

A. G. D. (Liverpool).—Commissions in the R.F.C. can only be obtained by youths of 18 and upwards. A decent education is necessary, but university or first-class public school training is not essential. Training at a civilian flying school is helpful, but does not itself entitle the holder of a pilot's certificate to a commission. In a similar way, experience with internal combustion engines is useful, but not essential. You are recommended to study other Answers to Correspondents bearing on the same subject in recent issues of The Aeroplane.

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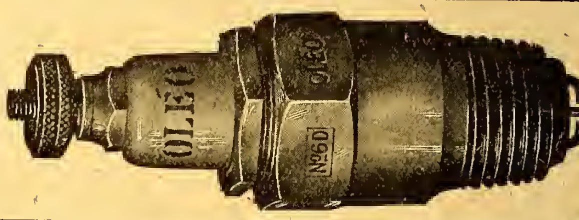

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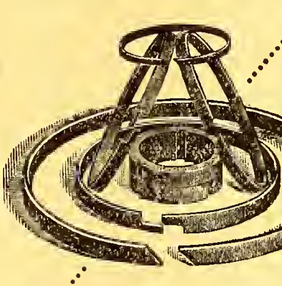

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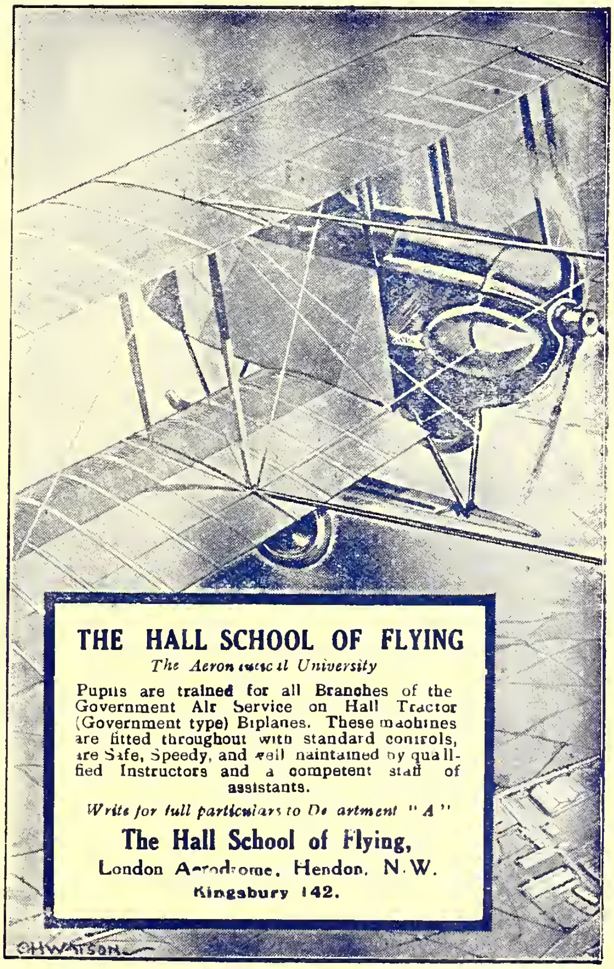

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WEDNESDAY, FEBRUARY 7, 1917

Edited by C. G. Grey

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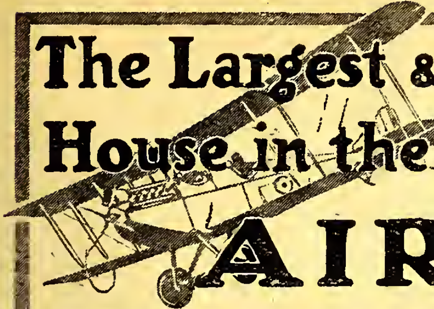

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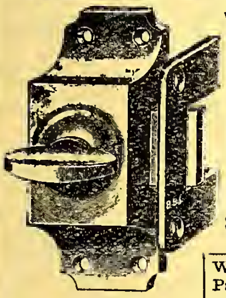

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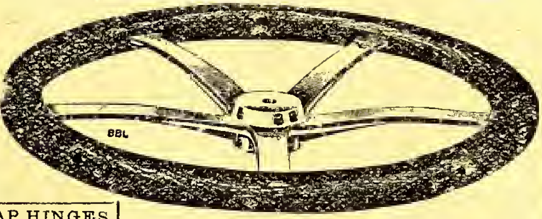

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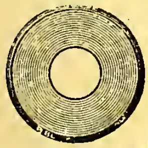

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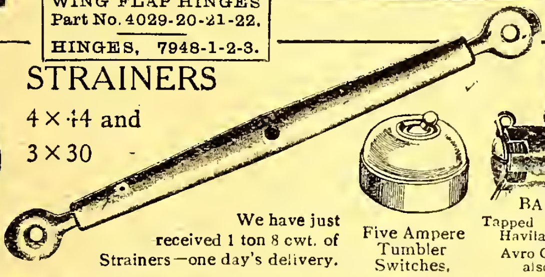

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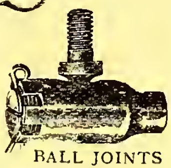

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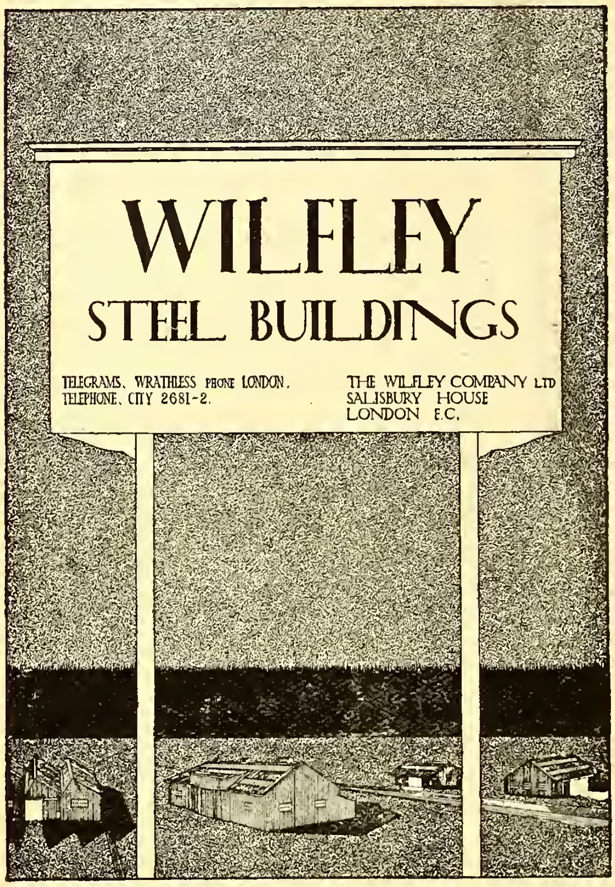

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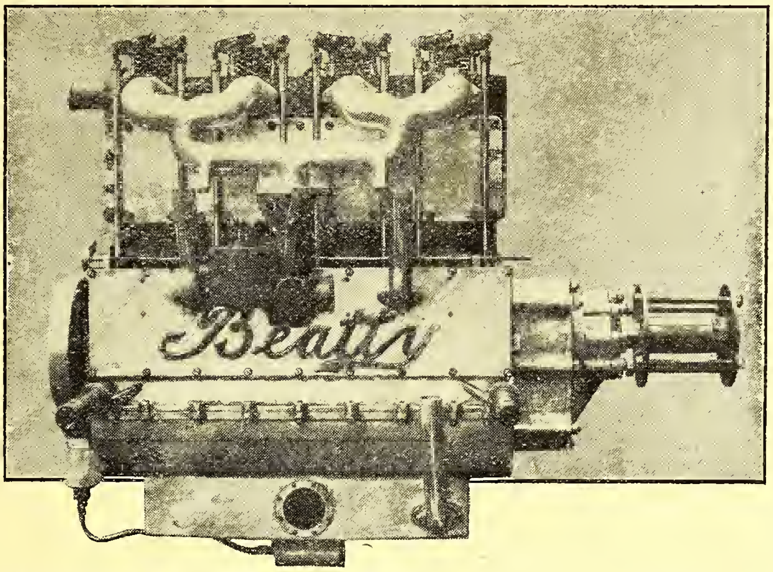

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ON THE ADDITIONAL RECOMMENDATIONS OF MR. BRIGHT.—(*Concluded.*)

(ix.)—Essential Extensive Development of Air Service.

I submit that the future development of Military Aviation on an extensive scale is eminently desirable. Material increase in the number of our aircraft, flying schools, and aerodromes will naturally help towards such development.

There exists still, without doubt, a shortage of high-class machines and engines for meeting what lies before us. A far greater number of aircraft, adequately engined, is essential.

This conclusion is forced on anyone who at all closely reviews the present outlook on account of:—

(a) The important part the air is undoubtedly going to take in warfare—partly owing to the comparative cheapness of aerial strategy as compared with sea strategy—even the biggest and most expensive airship not costing one-tenth what has to be paid for a "Dreadnought." Thus, it is even conceivable that our main line of defence may before long be in the air.

(*b*) The necessity for a far-reaching and really secure permanent defence of these islands against air raids.

(*c*) The now abundantly proved value of aeroplanes for successfully attacking Zeppelins.

But the need for increasing our air strength in mechanics, instructors, pilots, and Home Defence Stations is still more markedly insistent. It is the lack of mechanics, etc. (due largely to munition demands), more than anything that retards the supply of engines and in a lesser degree of aeroplanes.

Similarly, the comparative scarcity of first-class Flying Instructors keeps back the output of efficient pilots.

The supply of high-class observers must also be considerably extended. Moreover, the observer being really a more important person than the pilot—on a reconnaissance machine at any rate—his status needs to be improved upon in the future.

[On all these points everyone possessing intelligence will cordially agree. Great Britain is no longer an island, therefore Aerial Defence is at least as important as sea defence, and may be more so, because, while aircraft in the future will certainly be able to sink any kind of vessel used for conveying troops for an invasion, it by no means follows that seacraft will be able to sink aircraft. In fact they will obviously be unable to do so. Therefore Aerial Defence must take first place in the not too far distant future.

The personnel of the R.F.C. can be increased to an unlimited extent if the proper steps be taken, but it is first necessary for the War Council—not the Army Council—to decide on the precedence of the Services in importance as concerns the defence of the Nation.

There are plenty of first-class instructors in the R.F.C. if they are chosen with care and encouraged to instruct. It seems that those already chosen are open to improvement, seeing that the despised Civilian Schools at Hendon under military control are turning out more pilots than the military elementary schools which have more instructors and more machines.

Possibly the direct financial profit open to the Civilian Schools accounts for a good deal of the extra output.

As regards Mr. Bright's remark on R.F.C. observers, they are by common consent the bravest men in the Corps, and they certainly deserve more recognition than they get. Every lad without nerves and with a good eye, who develops into an effective scrapper, gets honours galore, but the observer, who is frequently much his mental superior and his Service senior, comes in for the kicks if his report is not altogether what was expected of it, and gets none too much credit if it is all that the most exigeant C.O. could desire. However, observers in these days are frequently put in command of Flights and Squadrons, and most of them become pilots sooner or later, so they have less cause to grumble.

The worst trouble is that an observer is born, not made, and yet has to be made by experience, even after he is born, for no man can "read a movement" of troops without a proper military education, whereas anyone can learn to fly in five or six hours. Consequently there is always likely to be a shortage of first-class observers.]

(x.)—Increased Output and Additional Factories.

In order to provide the enormous increase required in our supply of aircraft and aero engines, considerable development of the factories concerned therein must follow as soon as the necessary labour is available. To meet this, I would urge the payment of suitable Government subsidies. Attaching considerable importance to a large and continuous output of aircraft without interference from the enemy, I would further urge that in most instances this additional source of supply should be secured, for strategic reasons, by means of supplemental factories in a part of the country as far west or south-west as possible.*

For the same reason these works should, I think, be built underground as far as practicable, and all possible precautions taken towards secrecy such as, more or less, obtains in a factory under Government control.

[So far as the present war is concerned, increase in output depends primarily on the ability of the gentlemen charged by the Ministry of Munitions with the output of aircraft. If they work amicably with the Aircraft Industry and control their subordinate officials skilfully, an enormous increase can be made in the output of existing factories. Secondarily the increase depends on the ability of individual factory managers to organise their own output. The result remains to be seen.

---

* The further an airship (or an aeroplane) has to travel from her base the more fuel required, and, therefore, the less weight in bombs she can carry. Thus, there is no useful purpose in raids beyond a certain range depending on the speed of this class of aircraft.

For the present the suggestion of underground factories is not of prime importance, but in preparation for future wars it is very important indeed. By a merciful dispensation of Providence, the steep-sided low hills of the South and West are eminently suited for such a purpose. Caverns could be constructed without much trouble in the South Downs, the Portsdown Hills, the Mendips, in the Somerset Hills South and West of Bristol, in the Peak district, and in Lancashire and Cumberland, which would be invulnerable against hostile bombs.

In future wars the towns and factories in the flat Eastern Counties will simply be abolished in the first week of war—unless we then hold that absolute Command of the Air which is the essential of our national existence in the future. And even then a well-equipped enemy might score a momentary success. So the underground factory is worth considering, not only for aircraft, but for all necessary work as well.

Secrecy is, of course, of some importance, but not nearly so important as the encouragement of new ideas. One of the best business men I ever knew delighted in showing rivals round his factory, on the principle that if a rival saw anything to his advantage it would take him six months to make it on a commercial scale, and by that time my friend reckoned that he would have something better, or be unfit to remain in business. And he was always far in front of his silly old-fashioned competitors who kept all their silly old-fashioned ideas a dead secret.

Take the "tanks" as an example. They were the deadliest "hush-hush" for a year or so, yet, for a year before that, hundreds, if not thousands, of people had been talking about them, and though they were a surprise to the Hun in the trench, they must have been familiar to the German High Command, who did not use them presumably because he knew that, with his numerical inferiority, trench warfare suits his game better than open warfare.

If we had made them when we should, during the winter of 1914-15, they would have been in action at Neuve Chapelle, and the war would now be of quite a different complexion. As it was, we huddled over a secret known to everybody but ourselves, and lost our grand opportunity.

Let this be a lesson in secrecy to those in control of our future aircraft policy.]

(xi.)—Night Landing Grounds.

Steps should at once be taken, so far as may be, to establish more large and thoroughly satisfactory night landing grounds, capable of being adequately lighted and darkened at a moment's notice, and such as will get over the necessity for the return of machines to their base before dark. Failing anything more convenient, possibly some of the large racecourses still available might be commandeered for the purpose.

[Thanks to a couple of very energetic young officers, the landing-ground question has been extraordinarily well handled, since the scandal at the beginning of last year drew attention to the matter, so there is practically nothing to be said on this point.]

(xii.)—Lights for Night Landing Grounds.

Whilst, undoubtedly, the light obtained from the ordinary petrol flare is better suited to the purpose than the white light from the usual electric arc lamps,† the same does not apply in the case of the comparatively new flame arc lamps, which I recommend for this purpose. These give a yellow-red arc when the carbons are made in a manner separately communicated. Indeed, the light produced by the yellow flame carbon has the highest penetrating power of any known illuminant, and is at great advantage over all others (including petrol flares) in foggy or hazy weather. The light obtained from these special flame arc lamps (fitted with yellow flame carbons) is very near in colour to petrol flares, but is considerably more powerful.

A further and important advantage in an electric lighting system of the special type named would be that, unlike petrol flares, all the lights can be simultaneously switched on and off at a moment's notice.

[A very important recommendation. The petrol flare is clumsy, dangerous, and expensive. One bucket of petrol would give all the light needed if used as fuel for an engine driving a dynamo. The yellow flame arc was fairly familiar as a light in front of shops and theatres before Zeppelin-funk threw us into ignominious darkness, and one hopes that Mr. Bright's simple yet brilliant suggestion has been put into use.]

(xiii.)—Coast Patrols.

Following the example of Paris, an extensive system of air patrols round our coasts would be highly useful by way of defence against enemy aircraft—if and when the supply of aeroplanes and pilots is sufficiently increased.

[The patrol system has undoubtedly been much improved since Mr. Bright wrote these recommendations, which were, of course, in the hands of the authorities long before they were published. As pilots and machines increase in numbers, doubtless the patrols will be enlarged. At any rate, one hopes so, for undoubtedly the German Air Services will make a great effort to retrieve their reputation by making a big raid on London, even though they know they will lose half their craft in doing it.

The long spell of bad weather has given them time to refit many worn airships and to build many new ones, so a really big assault may be expected. Failing this, a raid by numerous aeroplanes will certainly be made early in the Spring, probably in bright moonlight or daylight, and we must be prepared to meet such a raid in the air, for the guns will certainly never see an aeroplane at 12,000 to 15,000 feet in our atmosphere.]

(xiv.)—Offensive Raids.

The Military Air Service should be so developed and brought up to such a strength that an organised system of attack and continuous bombardment is made on every point of strategic importance, including depots of every kind in the rear of the enemy's lines, railway junctions, rolling-stock, bridges, etc.

Such a recommendation carries with it the necessity for a concentrated development of the long distance raiding (bomber) aeroplane, capable of considerable endurance in the air, and having a wide speed range—i.e., a low speed (as well as high) for safe landing purposes—to meet the case of return by night.

[This is the complement to the preceding recommendation. Meet like with like, but strike at definite points of strategic importance, rather than drop things haphazard in the hope of hitting a munition factory.

Mr. Bright's *desiderata* in the way of bomb-dropping aeroplanes can be fulfilled at short notice, if the High Authorities want such things and will set about getting them.]

(xv.)—Aircraft Committee.—(For design of aircraft, engines and stores connected with aerial warfare.)

While I consider that the organisation of the Royal Flying Corps and the Military Aeronautics Directorate is of high order, it seems to me, with a view to meeting the future enormous development of aerial warfare, that certain changes in the form of administration will before long become desirable, if not actually essential—more especially in regard to the technical and material side of things.

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† That was settled so far back as 1885 when the South Foreland experiments were conducted at the instance of Trinity House (*see* "Report of the Committee on Experiments at South Foreland relative to Electricity, Gas and Oil as Lighthouse Illuminants.") (C.—4551.)

In the scheme indicated below an endeavour has been made towards the representation of all interests involved without any single official finding himself in a dual capacity.

Whilst, as a start, the necessary work has probably been conducted in the best way—or at any rate the only way that was available—the desirability for an executive staff of highly trained specialists will more and more force itself home as time goes on and as officers answering to that description come to hand.

It is hoped that such a plan will help towards the greatest possible expedition in the production of aircraft, engines, etc. Whilst full responsibility will thereby rest with the executive side of the committee, members of the consultative side will always be available when called upon for opinions at any of the meetings which would require to be more or less constant during a state of war.

The suggested abandonment of the Advisory Committee for Aeronautics would only mean that the individual services of its members would be turned to more useful account in the course of direct meetings with the executive side of the committee. It is thought, for instance, that the services of the highest authorities on various branches of the subject—such as internal combustion engines—would be of still greater value if the individual authority concerned were consulted in the manner suggested than would be likely at deliberations of the Advisory Committee as a whole.

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Superintendent of Royal Aircraft Factory.

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3. The carrying out of all experiments with aircraft, and reporting thereon.

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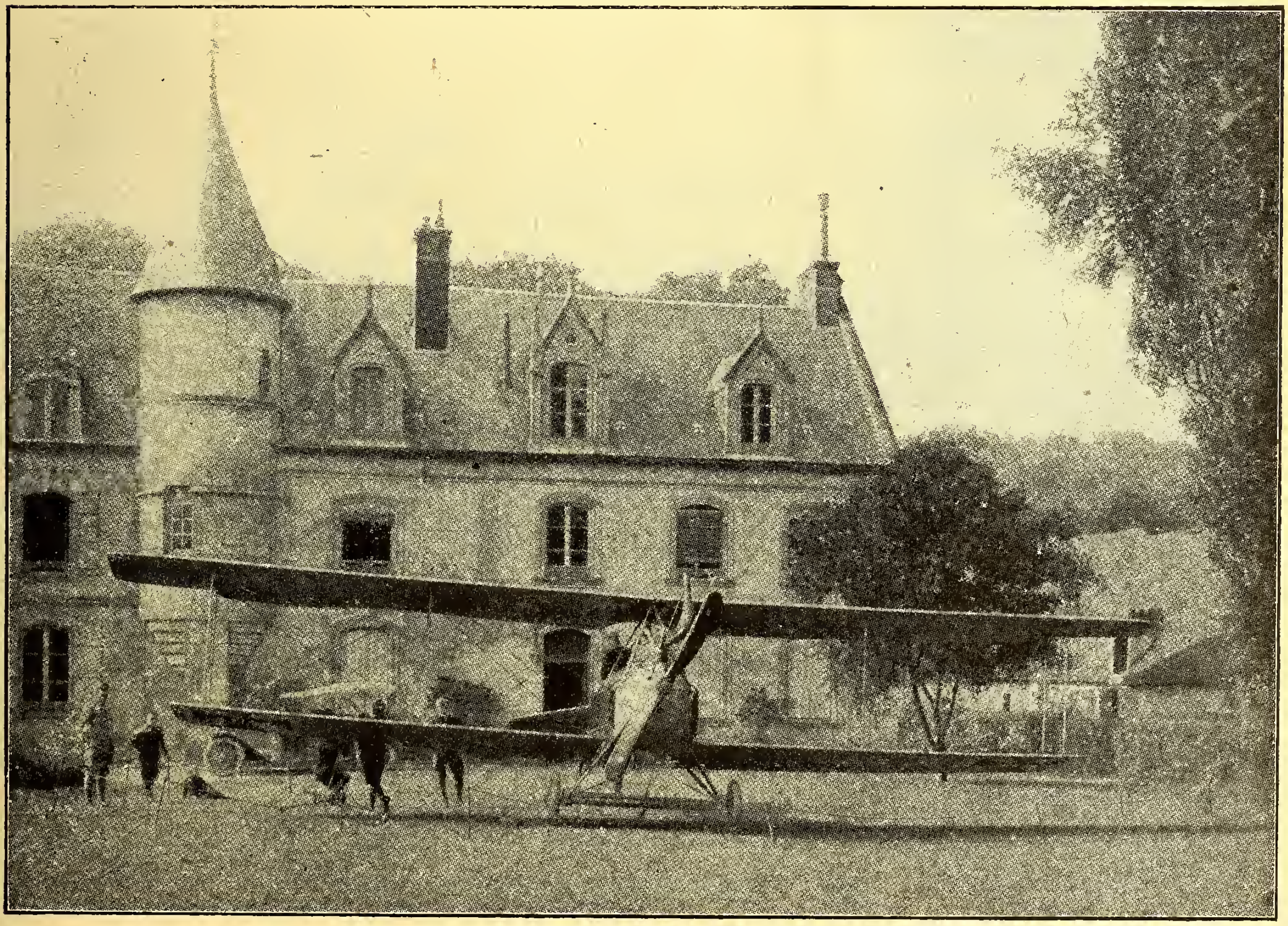
[*] To be called in as "witnesses" for consultation on specific points at any meeting they may be required for.

[†] Hence, under this scheme, the Advisory Committee for Aeronautics might, as a separate organisation, be suitably abolished.



Reproduced by courtesy of the French technical Journal "L'Aérophile," from a photograph lent by the French Service d'Aviation Militaire.

An L.V.G. biplane, type P.F., with extended upper wings.

NOTES.

1. It is suggested that on the Executive side of this Committee there should be at least two officers under the heads *a*, *b*, and *c*, as set forth. These positions would, it is considered, be most suitably filled by officers who have originally had a mechanical engineer's training.

Under Clause 2 amongst others, pilots (and even experienced observers, *per se*) are proposed. The former should be picked squadron commanders who have had material and up-to-date experience at the front.

2. The consultative side of the Committee is somewhat on the lines of the "Associate Members" of the Ordnance Committee in regard to guns, etc., at Woolwich—which plan, it is believed, works satisfactorily. By the introduction of additional (and independent) civilian experts, a certain amount of extra public confidence is likely to be secured. It is hoped that there would be no lack of consultation with civilians by military officers whenever an occasion arises.

I desire here to take this opportunity of testifying to the valuable scientific research and experimental work of (*a*) The Advisory Committee for Aeronautics, (*b*) The Aeronautical Research Department of the National Physical Laboratory, and (*c*) The R.A.F., the first based on mathematical calculations, etc., the second on wind channel experiments,* and the third on full scale experimental work—together with the study of many practical problems outside the range of purely scientific work.†

3. With the important exception of further introducing on the Executive side officers with a special mechanical training, this scheme would not materially affect the actual constitution of the existing personnel, but is more with the object of re-arranging the same on such a basis that no one is put into anything in the nature of a double position.

4. It is thought that neither those (*a*) responsible for the Inspection of Aircraft, etc., (*b*) for contracts connected therewith, nor (*c*) those controlling the R.A.F., should have executive responsibility in the general design and selection of aircraft. They are always available in a consultative capacity.

[Mr. Bright's scheme for administrating the supply of aircraft seems very sound.

Personally I think very highly of the Abandonment of the Advisory Committee for Aeronautics. I suggest abandoning them on some *atoll* in the Southern Pacific where they can study sea-birds, and advise one another on the art of sucking eggs. Whether merely "abandoned," or "suitably abolished," as recommended later, I care not, but if anyone insists on the latter fate, " something humorous with boiling oil in it" might meet the case.

Seriously though, the idea of placing executive power in the hands of half a dozen highly trained technical officers and of a dozen experienced active-service officers, and of using all the theoreticians as mere "witnesses," must delight any practical soldier-aviator.

The spectacle of all our high-browed scientists being called up in a "consultative" capacity by the active-service executive, and being told to "give your reasons and draw a map," is too gloriously Utopian to be possible. Still one can always cherish it as an ideal, and if the reality comes anywhere near it under the new system there will be much joy in the land, both here and in British aerodromes abroad.

Mr. Bright's unsolicited testimonials to the Advisory Committee, the N.P.L., and the R.A.F. (1916 type) have a happy air of *ave atque vale* which pleases one.

Perhaps I do Mr. Bright a grave injustice in thus interpreting his scheme, but that is how it looks to me. And, quite apart from any suggestion of humour, the scheme is as sound as anything yet produced.]

(xvi.)—Combination between Air Services.

I venture to think that considerable advantage would be gained if the two branches of the Air Service worked harmoniously together for their mutual benefit. For instance, material benefit would be likely to arise from periodic meetings between those in charge of each corresponding department for the purpose of interchanging views on new experiences, developments, etc.; and I am convinced that all research work—including full scale experiments in life-size machines—should be conducted on a mutual basis, the results arrived at being at the equal disposal of both branches.

By this means, too, unnecessary overlapping could be avoided, and administrative economy secured.

I am strongly in favour of the Air Board establishing a joint committee of supply for providing both the Navy and the Army with aircraft and its appurtenances, and should like to see this cover (*a*) a Joint Contract Branch; (*b*) a Joint Inspection Branch; (*c*) a Joint Equipment Branch; and (*d*) a Joint Inventions Branch.

The effect would be not only to bring the two Air Services more together, and reduce friction by competition, but also to substantially cut down expenses due to overlapping.

Further, it is to my mind clear that considerable benefit would accrue from the naval and military Air Services being co-ordinated under the control of a single organisation in the person of the Air Board.

[This recommendation is very much what has happened in practice, but the Joint Inspection arrangement does not seem to be definitely settled, nor does the Joint Contracts Branch, for probably both Services, as well as the Ministry of Munitions, will insist on inspection, and possibly on overseeing, if not on actually placing contracts.]

NOTE.—Recommendation XV is subject to Recommendation XVI; that is to say, if the two Air Services are—as would be preferable—co-ordinated, at any rate in the matter of design and supply, the suggested Aircraft Committee would require to be modified in its personnel by the executive side being equally composed of naval and military officers.

CHARLES BRIGHT.

TO THE SECRETARY, WAR OFFICE.
November 17th, 1916.

[Taking the Recommendations by and large, they display not only a sound knowledge of the subject by the writer, but a vast amount of clear thinking. The fact that Mr. Bright took the trouble to go so deeply into the whole business is an indication of the seriousness with which he took his duties on the Inquiry Committee, and probably accounts in no small measure for many of the conclusions at which the Committee arrived.

One can only hope that Mr. Bright's official connection with aircraft will not cease with this report, but that those in power may use his knowledge and evidently acute reasoning power to good advantage in the future.

C. G. G.]

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* These experiments with model aeroplanes of given design have proved of considerable value in determining the best pattern for wings, etc., to meet different requirements.

† Much is due to the "R.A.F." for the practical development of (*a*) inherently stable aeroplanes, and (*b*) wires designed for reducing head resistance. [Both of which ideas existed long before the R.A.F. thought of them, but the poor starved aircraft makers could not afford to experiment.—C. G. G.]

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TRAINING.—III.

BY "BERKELEY."

Before a commander is able to prepare an "Appreciation of the Situation," he must have before him all available information, not only in regard to the enemy, but in relation to his own forces.

In the acquisition of knowledge of enemy dispositions the Royal Flying Corps has nowadays an important part. For days and possibly weeks before the beginning of operations, Service aviators fly over enemy territory in search, not only of what may be visible to the eye, but of signs from which careful deduction may bring intelligence. If from day to day aircraft are permitted to pass over tracts of hostile country, practically unmolested, and consistent resistance is encountered from enemy aeroplanes when an endeavour is made to pierce the veil of secrecy enshrouding another area, there is an obvious conclusion to be drawn—that the enemy has something to hide in the heavily guarded region.

Further investigation may bring further light, but, even should the enemy cordon be inviolable, there still remains the valuable indication of a centre of interest. Other links in the chain of reconnaissance results may help to lift the veil.

Confirmatory Evidence.

The cavalryman has also his very important share in the original reconnaissances proper to a war in which seemliness is not sacrificed to expediency. Much that is hidden from the scout of the skies is revealed to the horseman. Shelters subtly arranged and coloured above in material the colour of which blends so successfully with the surrounding ground as to mislead the aviator are clear to the sight of the cavalry patrol. His business is the elevation, whilst the aerial observer deals with the plan. The scout on the ground can interrogate the inhabitants of the debatable country, and, whether they be friendly or not, all that they say is of value, even if on occasion negative information alone is gleaned.

On the cavalry depends the selection of positions in the approaching operations for the units composing the army to which it is attached. The class and number of useful roads, the depth, fordability, and speed of the stream of rivers encountered are all tabulated for possible use in the days to come.

The evidence of spies, accepted with reserve, and only made use of when some manner of confirmation is obtained from other sources, also adds to the general store of knowledge.

Collation by the Staff.

The General Staff collate the varied reports made from the air or the land in such a manner that a connected dossier of information is ready for the use of the commander in the preparation of his plans.

This in brief is the manner in which information is gained before the beginning of operations. Countless details have received no mention, owing to the lack of space in this periodical and the probable lack of patience in the reader.

Operation Orders.

From the information at hand and the natural skill of the commander a plan is decided upon and outlined. At this point begins the compilation of operation orders for the encounter battle, a work in its entirety of intense complexity, which is the decisive step towards action. It is in this matter that the training of an army comes most strongly into prominence.

To quote Field Service Regulations, Ch. II, para. 12, sub-para. 1: "Operation orders deal with all strategical and tactical operations, such as marches, protection, occupation of quarters, reconnaissance, and battle. They include such information regarding supply, transport, ammunition, medical, and other services of maintenance, as it is necessary to publish to the troops." And sub-para. 4 says: " . . . The object of an operation order is to bring about a course of action in accordance with the intentions of the commander, suited to the occasion, and with full co-operation between all arms and units. . . ."

The Tooth in the Wheel.

It is clear that in action there is no individual of an army who is not taking part. Each has his duty, and on his adequate performance of it depends more than is commonly imagined. An army in action is a vast and complicated machine, the failure of any part in which would probably cause the failure of the whole. A negligent platoon commander may bring about the complete disarrangement of the plans of even the most brilliant leader.

As with the individual and the platoon, so it is with the higher units, from a battalion to a brigade, division and army corps. Each is responsible for the adequate execution of allotted duties. It is impossible, apart from the inadvisability of the course, for a general officer commanding in chief to detail in his operation orders the manner in which the work allocated to a division shall be carried out, in so far as the employment of units is concerned, or the method adopted.

Confidence in Subordinates.

No commander can keep in detail touch with all parts of his command. The space occupied by a modern army in the field is so large that it is not even possible for a divisional general to keep in close touch with the units under him. The higher command must of necessity place a higher degree of confidence in subordinate officers.

A commander in preparing operation orders will indicate the work to be undertaken by each division and arrange the time-table on adherence to which rests often the difference between defeat and victory. His divisional commanders, who have, it is presumed, been selected for their efficiency, issue in their turn operation orders to the brigades under their direction, and so in graduated succession the orders reach those whose pleasure it is to bear the brunt of the fighting.

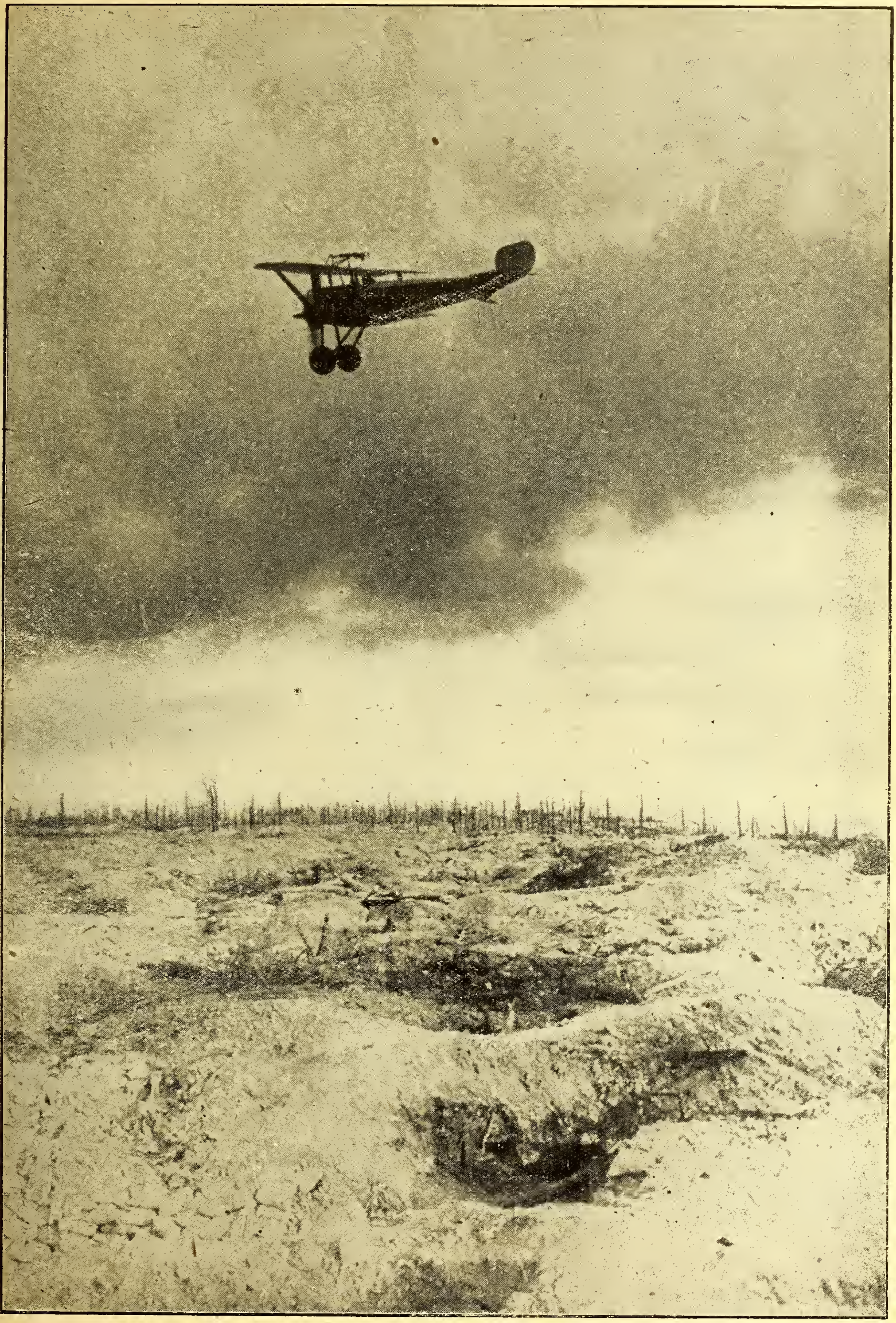
Orders must be drafted in such a manner as will prevent any ambiguity of meaning. Things that are clear to the commander as he compiles his orders are not known to his subordinates, and it is therefore impossible for them to add the missing detail to a badly drafted sentence.

The Inconsiderate Enemy.

Orders should be so arranged that if an unexpected move of the enemy, who rarely concurs in hostile operation orders, counters an essential manœuvre, it will not involve the defeat of the entire force. The alternative is, however, not necessarily stated to the subordinate who is executing the manœuvre, in order that his thoughts may remain concentrated on the object in view.

While it is always well that battle should be joined in the confident anticipation of victory, it is never wise to neglect the consideration of possible defeat and the proper extrication without undue loss of the troops engaged. It is not every commander who is gifted with sufficient genius and honoured by the opportunity of relying solely on victory.

His Grace of Wellington won the Battle of Waterloo



[*Official Photograph*

OVER NO-MAN'S LAND.—A Nieuport "biplan de chasse" crossing shell-torn ground somewhere in France.

through the negligence, if not the treachery, of Grouchy; but had defeat fallen on his arms, there would have been no recovery, for there was no line of retreat available save narrow roads, choked with transport, running through a great wood. And an army once deployed cannot retire in the space necessary for the approach to the field of action.

A Necessary Omission.

But orders for a possible retreat should, when drafted, not be issued to the subordinates concerned unless circumstances make it clearly advisable. There is in this retention of instructions for retirement something of that superstition which arises from a part of the ceremonial in the Greek service for the Burial of the Dead.

The object of a plan of battle is primarily to inflict defeat upon the enemy. With this in view, it is necessary that the offensive shall be decisively taken. The enemy possesses no natural instinct to act in accordance with the desires of his opponent, and it is therefore necessary to restrict his power of movement by means of a vigorous adherence to a comprehensive tactical scheme.

Each manœuvre in the attack should be designed with a view to occupying the enemy in counter-moves, to the exclusion of an independent offensive on his part. Delay, confusion, lack of cohesion, indecision, and neglect to adhere to the time-table all tend to more certain failure than would follow even a deliberate contravention of orders if the manœuvres consequent on the latter procedure were carried out with determination and élan.

The Air Scout's Opportunity.

The present system of parallel warfare, resembling closely as it does the siege warfare beloved by the Marshals of France when Louis XIV was King, causes considerable alterations in the operation orders drawn up for an impending battle. Reconnaissance differs in the manner of its execution. The aerial scout is pre-eminent.

He alone, with the aid of photography, can win information of value to the commander. Land scouts have no possibility of penetration. Patrols by night can on occasion discover points of value, but the information gained is negative rather than positive. A determined raid will bring intelligence in so far as the cross-examination of prisoners taken is of value.

Documentary news taken in this way is rarely illuminating, as it is not customary to keep documents of importance in the fire trenches. The instructions in captured routine orders and in special orders to battalion commanders often give information as to local conditions, but the area affected is very restricted.

Deserters will speak readily and with dangerous facility as to the conditions obtaining behind the lines, but apart from their inability to see or understand more than is obvious in their immediate trench sector they are naturally not indisposed to depreciate in exaggerated terms the service to which cowardice has made them traitors. Their tales must be taken with caution.

Therefore it is the aviator on whom the main duty of reconnaissance falls. On news from the air, supplemented by detail photographs, will depend in a high degree whether victory or defeat will end the day.

In siege warfare, registration of artillery is of the first importance. In open warfare, registration is not possible, and the gunners must use that science in which they have been so well trained, and for which they are rightly renowned. Range-finding during the progress of the action, when speed is an essential, is substituted for the leisurely work of being spotted by aircraft onto targets in the days immediately preceding the battle.

THE CLOSING OF THE R.N.A.S. COMFORTS FUND.

Officers and men of the Royal Naval Air Service will learn with deep regret that Mrs. Sueter has been obliged to close the R.N.A.S. Comforts Fund, owing to Commodore Sueter having been ordered on foreign service.

Mrs. Sueter writes that it has been a great pleasure to her to work for Commodore Sueter's men for the last two and a half years, and from the many letters which have been received it is evident that this energetic lady's work has been highly appreciated by the men who have benefited from the Fund, and by the officers who have been made the more easy in their minds about the welfare of their men by seeing them thus benefited.

The work for this winter is now practically completed. Most of the money donated to the Fund has been spent, and the proceeds distributed to the various units of the R.N.A.S., as have the various garments collected. What remains of the Fund has been divided among the members of the committee, which was only formed three months ago, so that each member may use it for that section of the Service which is under her particular care.

The moment is therefore opportune for closing the Fund for this winter, but if—as seems most probable—another winter campaign has to be faced and fresh funds collected, the remaining members of the committee may rely on the support of former subscribers, headed by the Aircraft Industry, which owes so much to the R.N.A.S., and especially to Commodore Sueter and Mr. Winston Churchill (then First Lord of the Admiralty), who adopted the policy of supporting British manufacturers before the war, and saved the "Trade" from extinction at a time when no Army or civilian orders were to be had, and when all but Naval aeroplanes and engines were of French or official British design.

The final subscriptions to be announced are:—Lady Murray, £5; The Hoyt Metal Co., £2; The Society of British Aircraft Constructors (total donations, during the winter only), £2,105.

This brings the grand final total of the Fund to £4,720 11s. 2d., a very respectable sum to be collected and distributed in the form of comforts by one lady, working practically single-handed—at any rate, till three months ago.

None will be surprised, therefore, to hear that Mrs. Sueter is going to take the rest which she has so well earned and so long urgently needed. Consequently no further parcels or contributions in cash should be sent to her. Nevertheless, one assumes that letters addressed to The Howe, Watlington, Oxon, as hitherto, will continue to reach Mrs. Sueter, wherever she may elect to take her deserved rest, and one feels sure that many letters to be so forwarded will be written by men of the R.N.A.S., who have now come to regard her as their good fairy.

Nothing could surpass the devotion with which Mrs. Sueter has laboured for the comfort of R.N.A.S. ratings—no hospital nurse could have worked harder—and this kind-hearted and able lady may rest assured that her name will always live in the memory of the men for whose comfort she has done so much throughout the war.—C. G. G.

THE AERONAUTICAL HISTORY SHOW.

Lady Drogheda's exhibition of historical aeronautical pictures, and of sundry relics of recent events in aeronautical history, at the Grosvenor Galleries, is certainly one of the centres of interest in London to-day. By the time these notes appear the King himself will probably have visited the exhibition, which will thus have received the highest mark of distinction which any public exhibition can obtain. Already the Duke of Connaught, Lord and Lady Cowdray, and many others of the leaders of the nation, have visited the Grosvenor Galleries, and the length of their stay, together with the close attention with which they have inspected the exhibits, has borne witness to the absorbing interest of all that is to be seen there.

We have had aero shows in this country which have been highly educative so far as current developments were concerned, but this is the first time that it has been possible for all and sundry to see for themselves the development of aerial navigation from its earliest days. Lady Drogheda has done a notable service to British aeronautics in organising the exhibition, quite apart from the charitable objects on account of which she set to work.

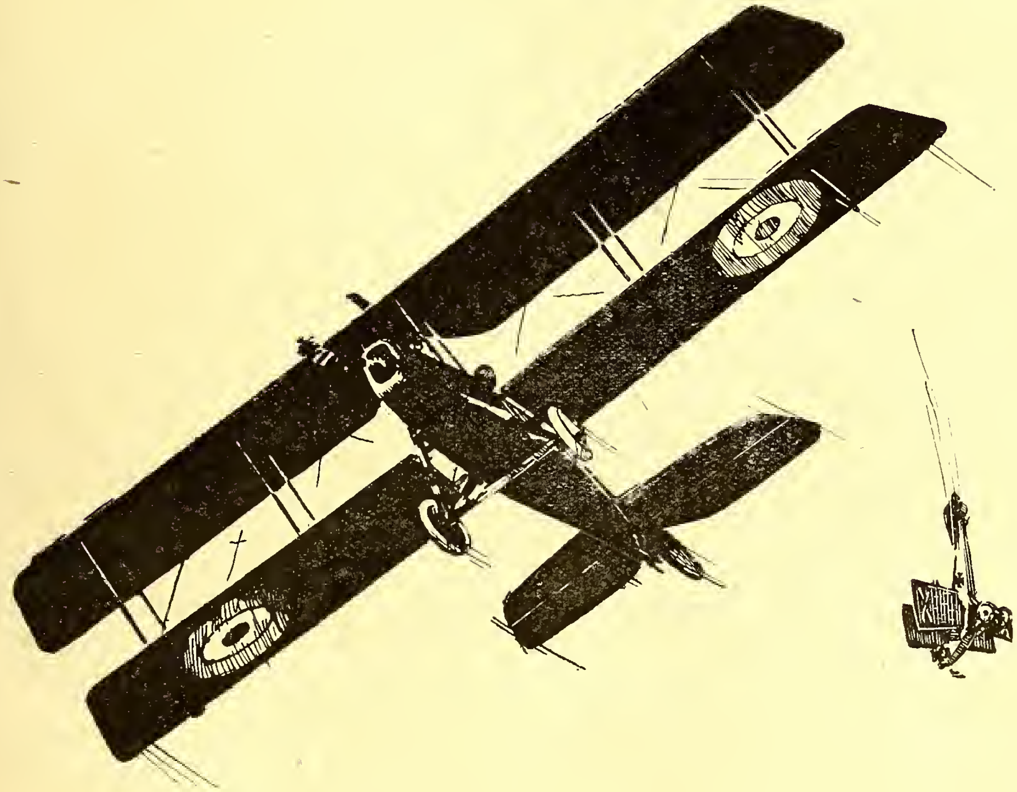
One is happily able to record that the aforesaid charitable objects will certainly profit very considerably through the sum already received. The actual entrance-money taken at the door amounts to a very respectable sum, and in addition several handsome donations have been received.

Among those immediately concerned with aircraft the following have sent donations:—

Mr. Holt Thomas, of the Aircraft Mfg. Co., Ltd., £50;
Mr. Sopwith, of the Sopwith Aviation Co., Ltd., £50;
Maj. Gordon Watney, of Gordon Watney and Co., Ltd., £50;
Vickers Ltd., £50;
C. G. Spencer and Sons, 25 guineas;
Mr. G. H. Mansfield, of the Aircraft Supplies Co., Ltd., 10 guineas;

Contractors to H.M. Admiralty and War Office.

A BRITISH PILOT AND A—



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Altogether a very good beginning, which one hopes to see materially augmented before long.

The price of admission, which began at 5s. for the opening day and became 2s. 6d. for a few succeeding days, just to suit the "elect," has now been reduced to the humble and popular shilling, plus the legal twopence entertainment tax—and remarkably cheap at the price it is. The Galleries are open from 10 a.m. to 6 p.m., so that almost anyone can find time to run in for an hour or so, except those working in offices or factories. In their case one recommends their applying for an afternoon off, for, if they are engaged in aircraft work, it is to their employers' as well as to their own advantage that they should learn something of aeronautical history

It is quite impossible here to enumerate the pictures on view, but the catalogue, which Lady Drogheda has compiled herself with surpassing skill, gives a cleverly arranged list of them. This catalogue, which sells at two shillings, is itself a very valuable record of what has been done, and ought to be in the possession of anyone concerned with aeronautics.

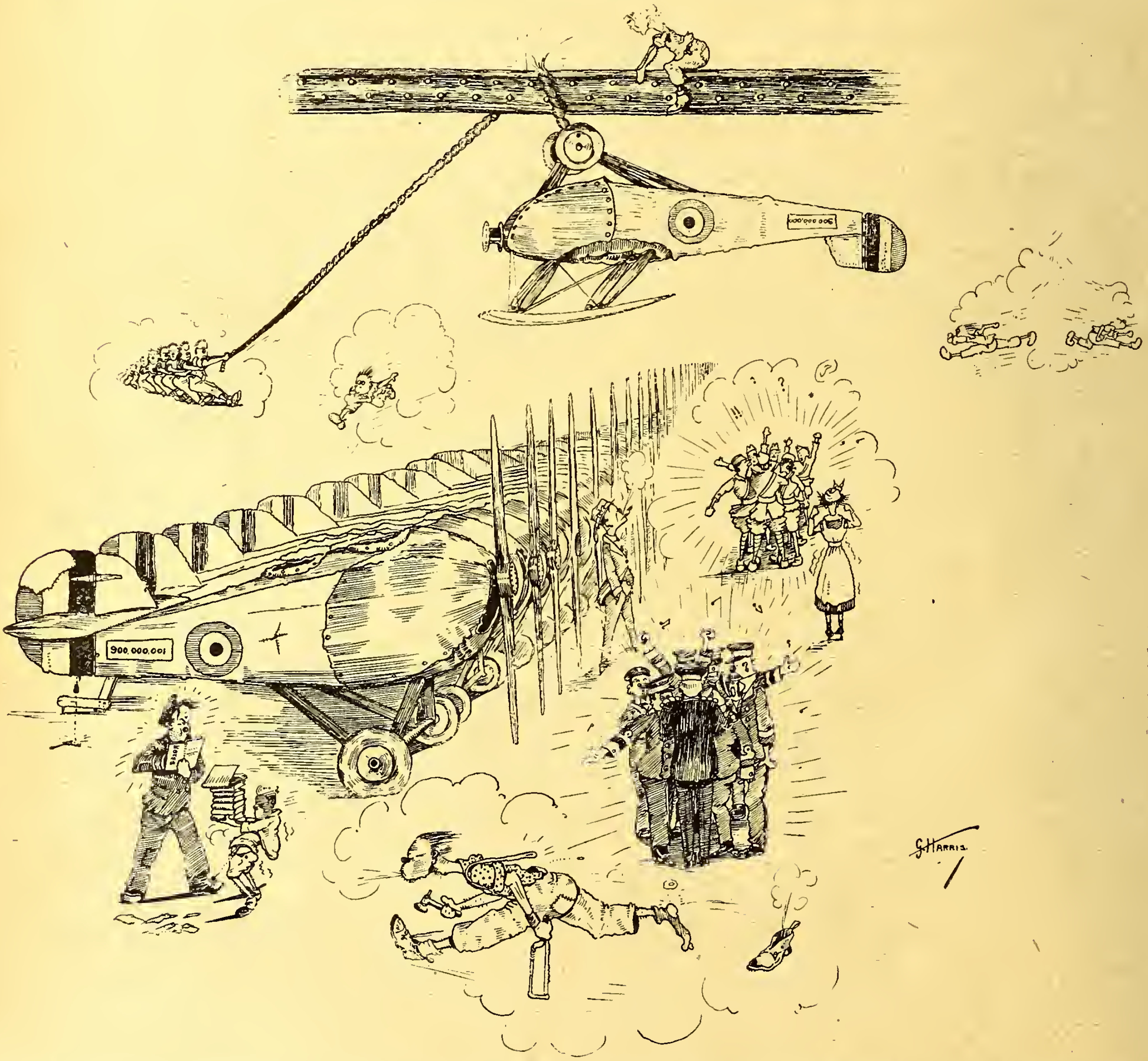
Not only does it contain a list of the pictures, but it explains many of them, and moreover gives much information in its appendices, which comprise an admirable dissertation on the invention of the balloon by Mr. Philip Gardner, a brief but most fascinating and all too short history of war-balloons from 1794 to 1865, by Lady Drogheda herself, and another by the same energetic lady on the earliest parachute descents, 1783-1837. There is also a brief history of Modern Aeronautics, a list of the first 500 aeronauts, and lists of aeroplane records, as they stood officially at the outbreak of war, and as they advanced from step to step before the war. This catalogue may be obtained for 2s. 6d. post free from the Grosvenor Galleries, and is well worth having, even by those who cannot visit the exhibition, as a book of reference on the progress of aerial navigation.

The pictures in the exhibition are themselves well worth the trouble of a visit, but it was, nevertheless, a good idea to include recent historical relics, models of recent machines, and photographs of recent events.

The public is now able to inspect at close quarters the Fokker monoplane which was exhibited some time ago on the Horse Guards Parade. The tail end of a Zeppelin is also to be seen and handled, so that one can judge its "made in Germany" construction. The bomb-dropping gear of a Zeppelin is also on view, and may be operated by those curious to know how the Germans commit actions "of no military significance"—(*vide* the Daily Press.) The parachutes used by our kite-balloonists in avoiding involuntary sojourns in Germany may also be seen.

The models include a capital example of the high-speed Vickers "bullet," another of the successful Armstrong-Whitworth two-seaters, another of the highly seaworthy Curtiss triple-engined flying-boat, and yet another of the twin-bodied Blackburn seaplane. There is also a model for a four-propeller rigid airship, more or less of Zeppelin type, and one of a "pusher" seaplane, lent by Messrs. Parsons. All of which are very interesting.

The active-service photographs are no less interesting, and one can heartily recommend everyone who is at all concerned with aircraft to make a point of visiting the exhibition, the more so as the proceeds will go entirely to the Flying Services, either directly in cash to the Flying Services Fund, or indirectly as material through the Irish Hospitals Supply Depots to the hospitals of the Flying Services.—C. G. G.



SCENES IN AN AIRCRAFT FACTORY: IV.—During the War.—The intense energy of the workers is of interest, as is the effect of the theoretical arguments between the groups of technical inspection officers. The mental efforts of the works official with the notebooks, in his endeavour to keep pace with the rate of delivery of machines, also deserves attention. The proprietor's attitude of satisfaction seems pardonable.

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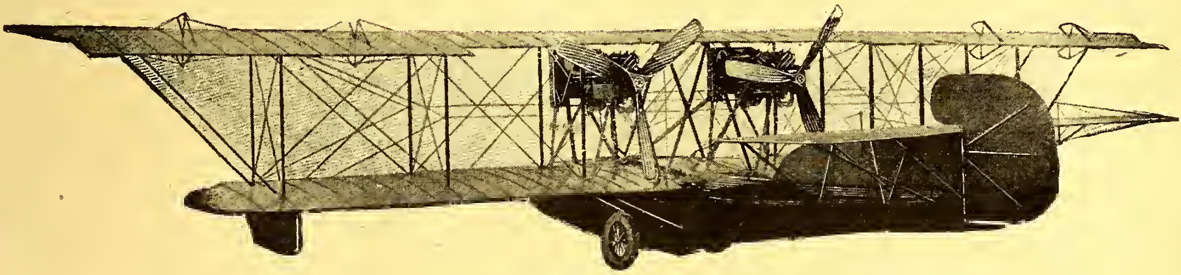

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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Jan. 30th, 1917.

Admiralty, Jan. 26th

R.N.A.S.—To be Flt. Comdr.—Act. Flt. Comdr. J. Bird, Dec. 31st, 1916.

War Office, Jan. 30th.

REGULAR FORCES. — Establishments. — R.F.C. — Wing Comdr.—Capt. (temp. Major) J. E. Tennant, M.C., Scots Gds., from a Sqdr. Comdr., and to be temp. Lt.-Col. while so empld., Jan. 11th.

Flt. Comdr.—Sec. Lt. (temp. Lt.) A. S. Redfern, R.W. Surr. R., T.F., from a Flying Officer, and to be temp. Capt. while so empld., Jan. 1st.

Flying Officers.—Sec. Lt. E. H. Bryant, Essex R., T.F., Jan. 5th. Sec. Lt. D. Welch, Spec. Res., Jan. 6th. Sec. Lt. E. L. Bishop, Worc. R., Spec. Res., from attd. Worc. R., T.F., and to be secd., Jan. 7th. Lt. B. Harvey, 224th Canadian (Forestry) Bn.; Temp. Sec. Lt. L. D. Brown, Gen. List, from a Flying Officer (Observer), seny. from May 31st, 1916. Sec. Lt. (on prob.) A. H. Tanfield, R. War Re., Spec. Res., Jan. 8th. Temp. Sec. Lt. A. A. Gray, M.C., Durh. L.I., and to be transfd. to Gen. List, Jan. 10th. Temp. Sec. Lt. (on prob.) F. J. Taylor, Gen. List, Jan. 11th. Temp. Sec. Lt. R. E. Asher, Gen. List, Jan. 12th. Sec. Lt. (on prob.) H. A. Moncrieff, Dorset R., Spec. Res., and to be secd., Jan. 14th. Temp. Sec. Lt. L. H. Leckie, Gen. List; Temp. Sec. Lt. R. C. Savery, Gen. List; Sec. Lt. D. F. Stiven, Spec. Res.; Temp. Sec. Lt. J. C. Griffith, Gen. List, Jan. 15th.

Balloon Co. Comdr.—Temp. Sec. Lt. W. S. Huxley, Gen. List, from a Balloon Officer, and to be temp. Capt. whilst so empld., Jan. 13th.

Equipment Officers, 1st Cl., and to be temp. Capts. whilst so empld.:—Lt. H. K. Maxwell, Spec. Res., from the 2nd Cl.; Lt. E. A. E. Wood, Spec. Res., from the 3rd Cl., Jan. 1st. Sec. Lt. (temp. Lt.) H. R. Vagg, Som. L.I., from the 2nd Cl., Jan. 14th.

2nd Cl.—Temp. Sec. Lt. T. G. Gordon, Gen. List, from the 3rd Cl., and to be temp. Lt. whilst so empld., Jan. 29th.

Schools of Instruction.—Instructor (graded as a Sqdn. Comdr).—Capt. J. V. Steel, R.A., a Flt. Comdr., Jan. 11th.

Memorandum.—To be temp. Sec. Lts. (on prob.) for duty with R.F.C.:—D. B. Walker, Jan. 12th. H. W. Arnott, Jan. 15th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—The following Sec. Lts. (on prob.) are confirmed in their rank:—A. P. F. Rhys-Davids, A. C. Young, D. F. Stiven, H. W. Prockter, D. Welch, A. R. Mitchell, S. G. Linssen, S. A. Mitchell, W. G. Murray, C. Groves, F. G. Buck, C. J. S. Holden, A. T. Griffith, S. J. Vine, S. Wilson, A. G. Stradling, J. A. Cowling, R. Rochford, J. D. Richards, L. S. Pape, W. S. Farley, E. P. Proud, F. D. Lugard.

H. H. Chivers to be Sec. Lt., Jan. 1st.

To be Sec. Lts. (on prob.):—E. H. Garland, G. G. A. Martin, M. C. McGregor, J. M. Warnock, Oct. 16th, 1916. G. A. Learn, Jan. 10th. E. McR. Cockell, F. Dugdale, F. T. Hill, R. A. G., Shepherd, C. Q. Steel, R. D. Whitt, Jan. 12th. D. R. Pye, Jan. 27th.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. R. F. J. Lord Camoys is secd. for duty with the R.F.C., Jan. 10th.

Infantry.—Lancs Fus.—Capt. E. H. Bedson is secd. for duty with the R.F.C., Dec. 23rd, 1916.

Hamps R.—Sec. Lt. W. B. Hills is secd for duty with the R.F.C., Jan. 12th.

* * *

From the "London Gazette" Supplement, Feb. 1st, 1917.

War Office, Feb. 1st.

REGULAR FORCES.—The following Wt. and N.C.Os. to be temp. Sec. Lts.:—

Memoranda.—For duty with R.F.C.—Sgt. W. J. Pearson, from D. of Lan. Yeo., T.F.; Sgt. L. R. Brereton, from Can. Engrs.; L.-Corp. T. Humble, from North'd Fus.; L.-Corp. J. E. Middleton, from A.S.C., Jan. 2nd. Pte. N. H. de V. Heathcote, from Lon. R., T.F.; Pte. H. H. Down, from Lon. R., T.F., Jan. 4th. Sgt. S. Cooper, from Lon. R., T.F.; Sgt. H. Fall, from Can. A.S.C.; Sgt. F. M. McLaren, from Can. A.S.C., Jan. 7th.

Establishments. — R.F.C. — Flying Officers. — Sec. Lt. J. S. Smith, N. Staff R., Spec. Res., and to be secd., July 17th, 1916; temp. Sec. Lt. G. E. Ransom, attd. R. Fus., temp. Sec. Lt. E. T. Carpenter, Gen. List, Jan. 6th; temp. Sec. Lt. A. Ralphs, L'pool R., and to be transferred to Gen. List, temp. Sec. Lt. J. Southall, Gen. List, Jan. 8th; temp. Lt. F. J. Martin, A. Cyclist Corps, and to be transfd. to Gen. List, Sec. Lt. (temp. Lt.) R. T. B. Schreiber, Suff. R., T.F., temp. Sec. Lt. O. Matson, Gen. List, Jan. 9th; temp. Lt. E. P. M. Robinson, Gen. List, from a Flying Officer (Observer), with seny. from May 31st, 1916; temp. Sec. Lt. A. S. Lee, attd. Notts and Derby R., Sec. Lt. E. J. D. Townesend, R.A., and to be secd., Sec. Lt. A. P. F. Rhys-Davids, Spec. Res., Jan. 10th; temp. Sec. Lt. J. R. S. Proud, R.W. Kent R., and to be transfd. to Gen. List, Sec. Lt. C. H. James, 5th Australian Inf., Australian Imperial Force, Jan. 11th; Sec. Lt. W. B. Hills, Hamps R., T.F., Sec. Lt. (on prob.) K. J. Knaggs, R. War. R., Spec. Res., and to be secd., Jan. 12th; Sec. Lt. H. W. L. Poole, D. of Corn. L.I., Spec. Res., and to be secd., Sec. Lt. J. E. Taylor, Welsh Divl. Signal Co., R.E., T.F., Sec. Lt. W. E. Holland, Sco. Horse Yeo., T.F., Jan. 13th.

Equip. Officers, 2nd Cl.—From the 3rd Cl., and to be temp. Lts. whilst so empld.:—Sec. Lt. G. L. Main, Spec. Res., Nov. 15th, 1916; Lt. J. S. D. Harries-Jones, Spec. Res., Sec. Lt. G. G. Fiddes, Spec. Res., Nov. 26th, 1916; Sec. Lt. A. Hunter, W. Rid. R., from a Flying Officer, and to be temp. Lt. whilst so empld., Sec. Lt. L. S. Newns, Spec. Res, from the 3rd Cl., and to be temp. Lt. whilst so empld., Dec. 1st, 1916.

3rd Cl.—Sec. Lt. J. A. Cowling, Spec. Res., Sec. Lt. W. C. Clark, Gen. List, temp. Sec. Lt. J. O. Cooper, Gen. List, Sec. Lt. Lord R. F. J. Camoys. Oxf. Yeo., T.F., temp. Sec. Lt. T. H. Cooper, Gen. List, temp. Sec. Lt. C. Channing, Gen. List, Jan. 10th; Sec. Lt. (on prob.) R. F. P. Hocker, Spec. Res., temp. Sec. Lt. (on prob.) F. J. Standerwick, Gen. List, Jan. 15th.

Memoranda.—Capt. R. B. Neill, Res. of Officers, is graded for pay as a Staff Capt., whilst empld. as a Co. Comdr., Cdt. Wing, R.F.C., Nov. 27th, 1916.

To be temp. Sec. Lts.:—Pte. H. J. W. McConnell, from a Divl. Ammn. Sub Park, for duty with R.F.C., Aug. 17th, 1916.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—The resignation of his commn. by Sec. Lt. (on prob.) H. Fuller-Clark, notified in the "Gazette" of Dec. 21st, 1916, is cancelled.

Sec. Lts. (on prob.) are confirmed in their rank:—R. F. P. Hocker, O. L. Vetter, J. H. Secker, H. R. South. H. J. Birtles to be Sec. Lt., Jan. 12th. C. S. Collingwood to be Sec. Lt. (on prob.), Jan. 18th.

TERRITORIAL FORCE.—R.F.C.—Maj. S. Heckstall-Smith to be temp. Lt.-Col., Sept. 1st, 1916.

Sgt.-Maj. J. S. Irving to be Lt. (temp.), Feb. 2nd.

Yeomanry.—Sec. Lt. E. G. Waters to be temp. Lt. whilst serving with the R.F.C., Sec. Lt. R. M. Findlay to be temp. Lt. whilst serving with the R.F.C. Sec. Lts. to be temp. Lts. whilst serving with the R.F.C.:—F. W. H. Thomas, C. D. Fellowes, Jan. 1st.

R.F.A.—Lt. J. W. Brown is secd. for duty with the R.F.C., Jan. 4th.

R.G.A.—Sec. Lt. R. S. Aitken to be temp. Lt. whilst serving with the R.F.C., Jan. 1st.

Infantry.—Arg. and Suth'd Highrs.—Sec. Lt. A. Gray to be temp. Lt. whilst serving with the R.F.C., Jan. 1st.

London R.—Sec. Lt. G. G. Crutchley is secd. for duty with the R.F.C., Dec. 23rd, 1916; Sec. Lt. A. C. Woodman, to be temp. Lt. whilst serving with the R.F.C., Jan. 1st.

Hertford R.—Sec. Lt. C. H. Gimingham to be temp. Lt. whilst serving with the R.F.C., Jan. 1st.

* * *

The King has been pleased to approve of the following Honours and Rewards for valuable services rendered in connection with Military Operations in the Field, with effect from Jan. 1st, 1917, inclusive:—

To be Companion of the Distinguished Service Order.

South African Forces.—Temp. Maj. Gerard Percy Wallace, Capt. S. Afr. Def. Force and R.F.C.

The Military Cross.

Sec. Lt. (temp. Capt.) Gerard William Hodgkinson, Yeo. and R.F.C.

Sec. Lt. Bernard Henry Esmé Howard, Manch. R., Spec. Res. and R.F.C.

Sec. Lt. (temp. Lt.) George St. Vincent Pawson, Yeo. and R.F.C.

South African Forces.

Lt. Lionel Cohen, S. Afr. Horse (attd. R.N.A.S.)

Temp. Capt. Edwin Cheere Emmett, temp. Lt., S.A. Def. Force and R.F.C.

The Distinguished Conduct Medal.

Z.179 Sgt. A. J. Horne, R.F.C.
Z.150 Cpl. S. F. Marucchi, R.F.C.
Z.8 Cpl. C. J. Thomson, R.F.C.
Z.31 Flt. Sgt. T. Turnbull, R.F.C.

* * *

From the "London Gazette," Feb. 2nd, 1917.

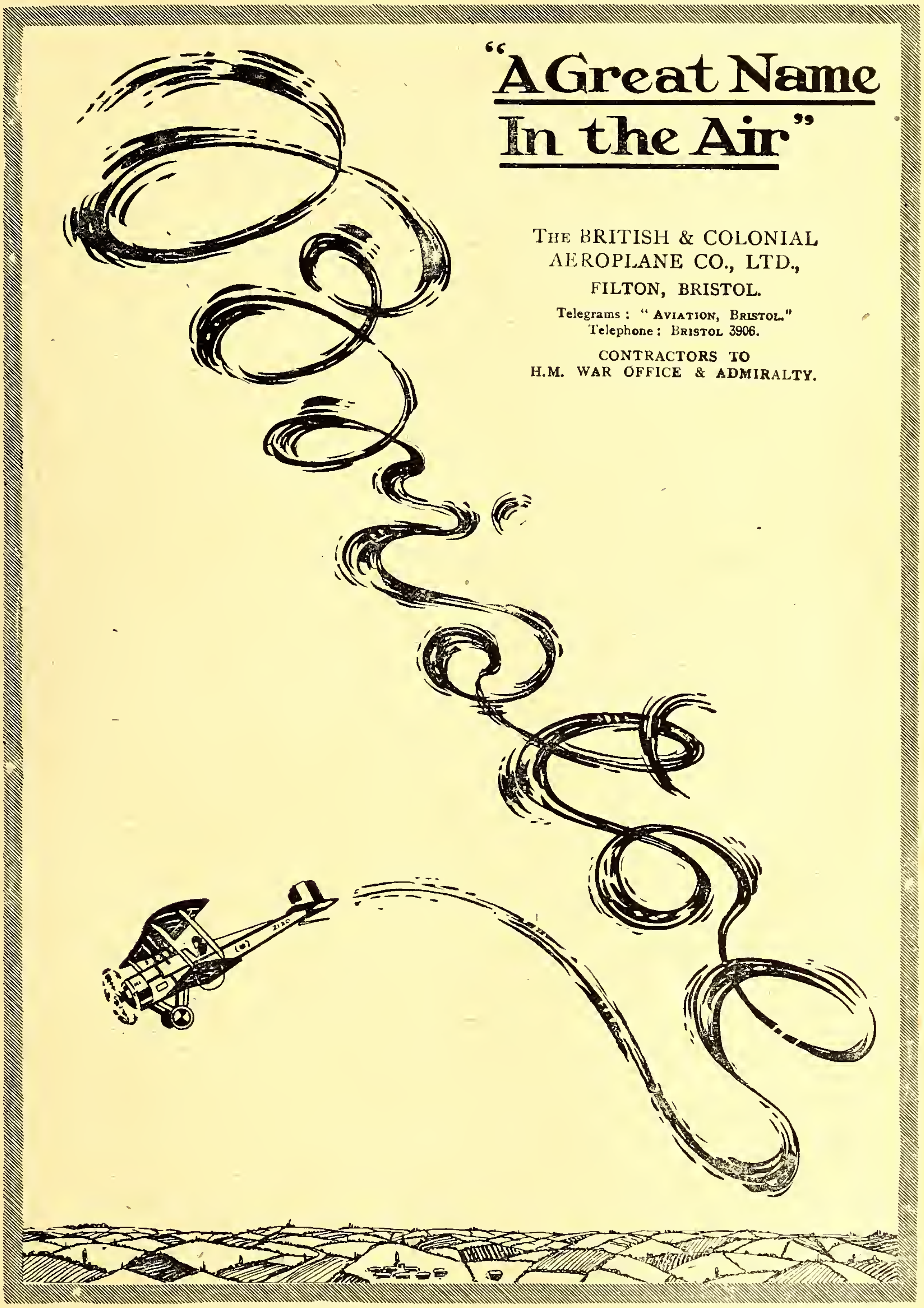
Admiralty, Jan. 25th.

Jan. 29th.—Flt. Sub-Lt. J. D. Marvin, R.N., who has relinquished commn. on account of ill-health contracted in the Service, to retain his commn.

War Office, Feb. 2nd.

REGULAR FORCES.—Establishments.—R.F.C.—Staff Officers, 2nd Cl.—Graded as Brig.-Majs.—Capt. J. A. M. Lang, Notts and Derby R., from a Staff Capt.; Capt. N. J. Gill, R.A., from a Brig.-Maj., Dec. 16th, 1916. Lt. (temp. Capt.) F. C.

(*Continued on page* 408)



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The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

II.—THE SUNBEAM MOTOR CAR CO.

A couple of years or so ago a discussion arose at a round table in the Royal Automobile Club on the merits of a well-known American runabout. The company included three editors of technical journals, and several other motorists of long experience. Someone called attention to the fact that the 20-h.p. engine of the car in question had a 90 mm. bore. "What would a British maker do with that?" I asked. "Yes," ejaculated one of the technical experts, "What would Coatalen make of it?" It is significant of the estimation in which Mr. Louis Coatalen, of the Sunbeam Motor Car Co., was held in the motoring world that his name was thus adduced, in such a gathering, as emblematic of what the British industry could achieve in the way of lightness with power.

Mr. Louis Coatalen.

Mr. Coatalen is known to fame in the flying world by his engines alone; but though there are no Sunbeam aeroplanes at the front it is not to be assumed that his interest in aviation was born only of the war, or is confined to the building of high-speed motors. As a matter of fact, he made his first trip in an aeroplane with Maurice Farman two years before the war broke out. Then, to show what an 8-cylinder 110-h.p. Sunbeam motor could do, he fitted one to a Maurice Farman biplane, which he bought personally in Paris, and it was flown at Brooklands for 150 hours, with Mr. Jack Alcock, now Flight-Lieut., R.N.A.S., as pilot. Mr. Coatalen is also a capable pilot, although he has not applied for a certificate, and he frequently goes up in order to gain practical experience likely to be of service to him in the work of design.

The 3-litre, or 80 mm. × 150 mm., engine which was fitted to the Maurice Farman biplane was the identical motor which had done so well in the Grand Prix race over the Boulogne Circuit, and added so materially to the laurels of the Sunbeam Motor Car Co. Then Mr. Coatalen astounded the motoring world by the production of a 12-cylinder motor of 225-h.p. Astonishment at its design, however, was quickly succeeded by amazement at its performance, for on the Brooklands track a Sunbeam car put up the world-famous record of 107.8 miles per hour, and thus established the fact that the 12-cylinder engine was no mere freak of design, but the most powerful and effective small-bored motor that had ever been produced.

Eventually, this type of engine came to be fitted to seaplanes, and in the "Daily Mail" "Round Britain" race of 1914, there would have figured a Sopwith Bat-Boat and an Avro with Sunbeam motors. The war, however, prevented the race from being held, and both machines were taken over by the Admiralty and delivered at Calshot. Up to that time the Sunbeam firm had tried in vain to obtain an order from any Government department. The cry was all for French engines, and no encouragement was offered to the British industry. "French engines were held up before us as ideals we should strive to attain," says Mr. Coatalen, "and, as it were, on the principle of 'if you could only do as well we should think a lot of you': the fact that we had something up our sleeve, and available, which could do even better being apparently never suspected; and, of course, until someone gives you an order you cannot improve. In fact, we had thought of giving up the building of aero-motors altogether, and were just about to drop it when the war broke out."

Then came urgent demands from the War Office for cars, and khaki Sunbeams, with khaki at the helm, were soon familiar objects on every side. But the Germans were marching on Paris; Ministers betook themselves to Bordeaux, and manufacturers transferred their plant to Lyons. The Admiralty could no longer obtain aero engines, and the short-sightedness of not having encouraged the native industry was brought home to them with unpleasant urgency. In the circumstances, they sent for Mr. Coatalen and placed an order for 30 or 40 engines, and within eight weeks of the declaration of war the Sunbeam Motor Car Co. were delivering aero motors in quantities, in the light of which fact no one could accuse them of not having got very quickly to work. The Admiralty had meanwhile induced the War Office to release the firm from their contracts as to cars and transfer them to another company; and the Sunbeam works were then taken over bodily by the Admiralty as a controlled concern. From that time onwards the Sunbeam Co. have been exclusively engaged upon Admiralty work, and, large as was the array of workmen at the outset, it has since been multiplied. The 8 and 12-cylinder motors, with side valves, were made in hundreds, and, incidentally, it may be mentioned that a regular weekly supply of the smaller engine has been kept up for the Russian Government, for use in the Sikorsky machines. The motors are fitted and erected by a Sunbeam mechanic.

Overhead Valves.

After a time, Mr. Coatalen re-designed his engines, adopting overhead valves, four to each cylinder, and made the engines much lighter. Larger types were also introduced, but of these one must say nothing here. But one thing, at least, may be said, and that is that the Sunbeam Co. rose to the occasion in a most spirited and commendable way, and that their remarkable engines can be delivered in any quantity. And it is a matter for congratulation that, although previously neglected by the powers that be, there existed in this country a type of engine which could be turned to at once when the foreign supplies failed, and could not only be produced in the required quantities, but give such satisfactory results.

Naturally, the Sunbeam motors have figured in many noteworthy events and places. They were fitted to the machines which went to the relief of Kut. Only a few planes, alas! were available, but with double that number the beleaguered garrison might have been kept going. The failure was one of numbers only, and enough was done to show that the uses of the aeroplane are wellnigh illimitable. Then, too, it must not be forgotten that the Short seaplane which flew over the German fleet at the battle of Jutland was fitted with a 225-h.p. Sunbeam motor, a combination which thus secured the honour of signalising the first occasion in history on which a seaplane was used in an actual sea engagement. The effective value of its performance may be gauged by the fact that within twenty minutes of being launched the seaplane was giving information of the formation of the German fleet. It was a Sunbeam-engined 'plane, too, that did most of the "spotting" work in the task of seeking out and destroying the "Königsberg."

In the raids on Zeebrugge, Sunbeam engines have been largely used. They did nearly all the reconnoitring at Gallipoli, and, most wonderful of all, perhaps, is the nature of their achievements over the Syrian Desert. Rough and very undulating as it was, this presented no possible landing places, and any failure on the part of the engines meant certain death to the pilots. In spite of this, however, they made hundred-mile flights in order to drop bombs on a railway that was being built fifty miles away. The start was made in every case from a seaplane-carrier on the Red Sea itself, and every pilot knew as he flew inland over the desert that he carried his life in his hands; but not a man was lost. Noteworthy, too, is the fact that these engines all did a hundred flying hours over a sandy *terrain* without being cleaned.

An Historic Service.

Last, but by no means least in importance, it has been stated unofficially that it was a Short-Sunbeam which brought down a Zeppelin raider out at sea off the eastern coast. The dramatic circumstances attendant upon that historic event have so far not been disclosed by the Admiralty, and cannot, therefore, be enlarged upon for the present; but if the public did but know what actually took place, they would be more outspoken than ever in their admiration for the pilots engaged. Suffice it to say that the D.S.O. which was awarded in this connection was well earned.

In due time, there will be more and many marvellous things to relate of Sunbeam developments, though, perhaps, the long-drawn struggle will be over before they can be fully described. On the war generally, on the future of the British workman, and many other things, Mr. Coatalen can talk in an enthralling way, but there is only one other topic which can now be legitimately touched upon. I asked Mr. Coatalen where he gained the groundwork of that engineering skill which has matured in such signal fashion, and he replied, modestly enough, that he owed everything to the thorough training which he received in his youth. A Breton by birth, he is a graduate of the Université des Arts et Métiers of France. "I cannot understand," he added, "why there is not a university of this kind in England. No man in France would have any chance of being taken on in a drawing office without a diploma from the Arts et Métiers." And he proceeded to detail at length the difference which exists between the thorough and systematic way in which a French draughtsman is trained as compared with his British confrère. There are four schools attached to the university in question—at Aix, Cluny, Angers and Chalons-sur-Marne respectively. They turn out a hundred men a year each. The undergraduates live in, and study from five o'clock in the morning to nine o'clock at night, including Saturdays, while they work till four o'clock on Sundays, and then go out for a "croc" walk, after the manner of our ladies' seminaries! Five hours' practical work is done daily in the workshops, so that the graduates leave well primed with practical and theoretical knowledge alike. This strenuous curriculum is maintained for three years. It could never be acclimatised, of course, in this country, where sport and athletics are essential factors in collegiate life; but, that consideration apart, Mr. Coatalen declares—and, as an employer, regrets—that there is no British institution which is in any way akin to the Arts et Métiers for the imparting of engineering knowledge, and that the fact indicates a weak spot in our national equipment.

THE USES OF THE BEATTY BIPLANE.

Excellent results have now been obtained from the little school single-seater biplane designed and built by Mr. George W. Beatty in his sheds at Hendon. The machine, which was illustrated a fortnight ago in this paper, is fitted with a 60-h.p. four-cylinder engine, also of Mr. Beatty's design.

This engine, which is a monobloc, with a geared-down tractor-screw, gives its power steadily and constantly, and is so designed that it can be built quite cheaply for school purposes. The maximum power is quite sufficient to permit of the machine being flown across country without driving on full throttle the whole time, which means that there is always a reserve of power when needed, and that the engine will last much longer than is usual with aero engines without being taken down for overhaul and cleaning.

Even at full throttle the engine seems to stand up well to its work, for one of the earlier engines which was fitted to a school two-seater biplane of the Wright type, and was taken down for inspection after 60 hours' running, showed no appreciable wear.

Another one, which had to be taken to pieces after about the same length of running, on account of a flaw in a cylinder-casting, likewise gave no evidence of the violent use to which it had been put in driving two big propellers through chains,—for though the big Wright propellers run easily enough when once set going, they must, of necessity, give engine-bearings plenty of work when starting and stopping.

On test with fuel for a couple of hours, the little Beatty biplane puts up a speed of something like 80 miles an hour, and its climb comes fairly close to 1,000 feet in the first minute, albeit without any special faking of propellers for the job.

Mr. Beatty's primary object in producing the machine was to provide a small single-seater suitable for the use of pupils after they have finished their training on dual-control machines, so that they can have plenty of practice alone, without taking the risk of their breaking up more expensively built two-seaters, or genuine war machines, and without, on the other hand, risking the pupil's safety by setting him to fly an obsolescent, or obsolete, war machine, with a defective engine of a type which has been condemned for war purposes, a custom the regrettable necessity of which was implied in General Brancker's recent lecture on the training of military aviators.

The machine, complete with engine, ready to fly, can be produced at a price, which means at a corresponding expenditure of man-power and material, which would barely produce, without an engine, an aeroplane of some of the types now used for training in solo flying. Moreover, the small size and handiness of the machine should make it particularly useful as an intermediate step between the flying of ordinary slow school machines and the fast single-seaters of 80-h.p. and upwards which a young pilot has to learn to handle at a "Scout School."

There is the further consideration that such a machine may very well find a ready market after the war as a mount for those who wish to fly for pleasure, as it can be easily housed, can be cheaply maintained in flying order and repaired in case of breakage, and can be flown without any vast expenditure of petrol and oil.

All the detail design of the machine is worked out with a view to ease and cheapness of production, without sacrificing strength, and without causing risk to the pilot by using cheap and nasty fittings. The parts can be readily standardised. In fact, barring the wood-work, the machine is actually built of standard parts practically throughout. Consequently, as an advanced school machine, it can be produced quickly and at very small expenditure of material and labour.

Taking it all round there is a great deal to be said for the adoption of the machine as a standard type school machine. The engine parts are so simple that they can be made in any small but decently equipped motor workshop, and the aeroplane parts could similarly be produced by any coach-builder or cabinet maker or piano manufacturer who desires to make aeroplanes, and who cannot be entrusted with the making of war-aeroplanes owing to lack of experience or lack of suitable plant.

One hopes that the machine will not be neglected by those concerned with the provision of material for the schools, for if largely adopted it would save much national wealth.

WAR SAVINGS AT MARTINSYDE'S.

A War Savings Association has been formed in the fuselage department of Martinsyde, Ltd., of Brooklands. A sum of over £117 has been subscribed by 46 members in the first eight weeks of its operations. At the moment the names of 66 members are on the books, and a very successful quarter's work is expected. It is hoped that similar associations will be formed in some of the other departments of the firm.

The idea is commended to the foremen in other works. The war is not going to last for ever, and the people with a little money behind them will be those who will not be left behind when times become normal, and the empty heads of British workmen of a certain type are succeeded by empty stomachs.

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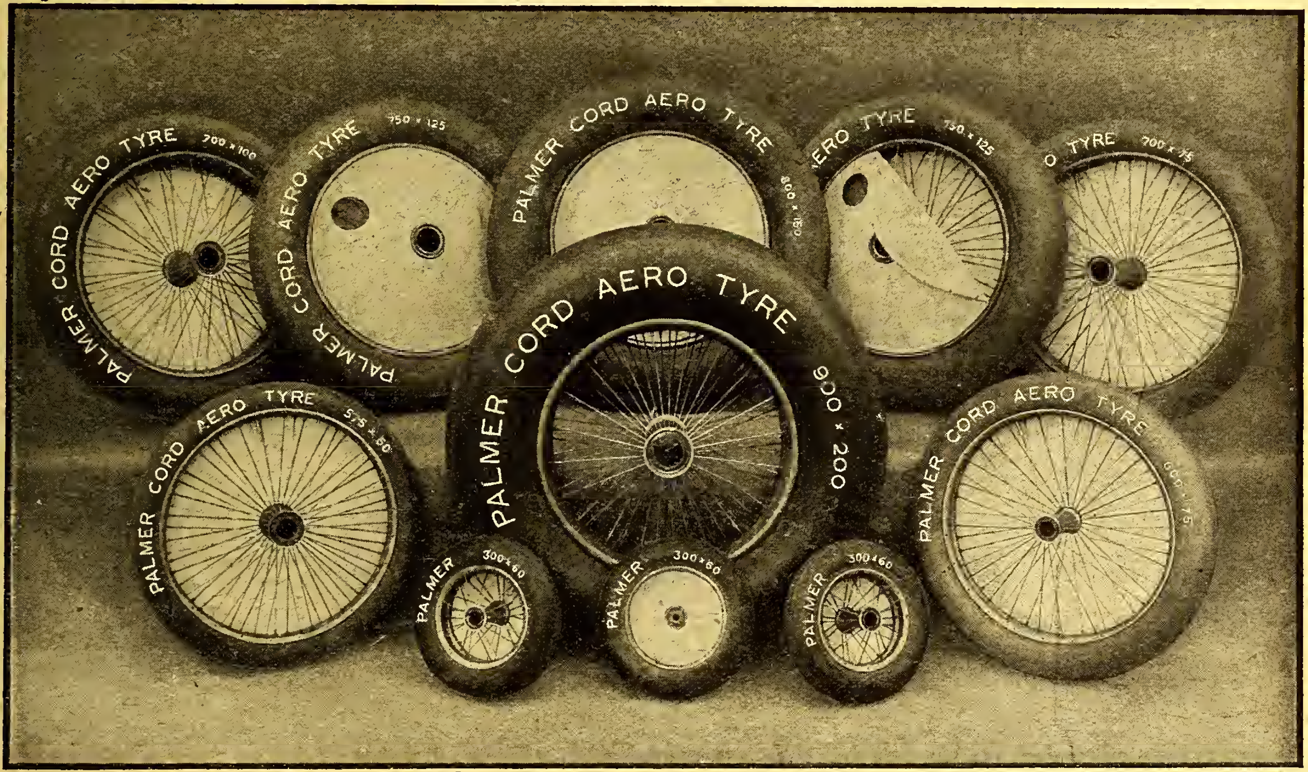
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		Length	Bore				Length	Bore				Length	Bore	
		m/m	m/m	m m			m/m	m/m	m/m			m/m	m/m	m/m
300×60	16	111.12	25.4	Central	700×75	9	178.	44.45	132/46	750×125	18	178.	44.45	132/46
"	17	72.39	12.7	Central	"	20	178.	38.09	132/46	"	26	150.	40.	Central
					"	75	178.	31.75	132/46	"	33	150.	38.09	Central
450×60	30	89,	31.75	Central	"	80	178.	44.45	132/46	"	38	178.	38.09	132/46
										"	66	178.	38.89	132/46
575×60	14	150,	38.09	104/46	700×100	2	185.	55.	135/50	800×150	8	185.	55.	135/50
"	21	160,	28.	Central	"	4	185.	55.	Central	"	10	185.	55.	Central
"	34	150,	31.75	104/46	"	18	178.	44.45	132/46	"	36	185.	55.	135/50
					"	26	150.	40.	Central	"	40	185.	60.32	135/50
600×75	14	150.	38.09	104/46	"	33	150.	38.09	Central	900×200	42	185,	60.32	125/60
"	21	160.	28.	Central	"	38	178.	38.09	132/46	"	47	185.	55,	125/60
"	34	150.	31.75	104/46	"	66	178.	38.89	132/46					
					750×125	2	185.	55.	135/50	1100×200	52	185.	55.	116/69
					"	4	185.	55,	Central	"	57	185.	55.	Central

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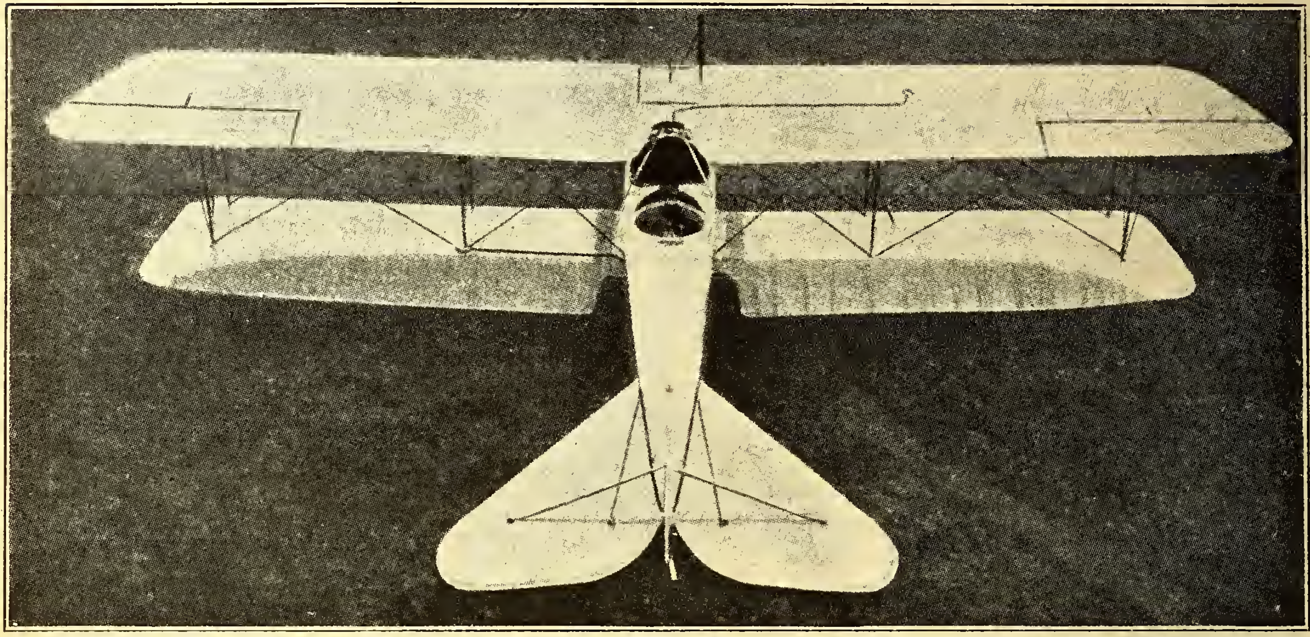
Some Facts and Figures of the Rumpler Biplanes.



View from above of the 1916 Service Type Rumpler Biplane.

That highly interesting French technical paper, "L'Aerophile," has recently published certain informative particulars concerning the German Rumpler biplane, which should be of interest to aeronautical engineers in this country.

The Rumpler monoplanes were, of course, familiar to everybody concerned with aviation long before the war, when Herr Rumpler was the accredited representative in Germany of the Austrian designer, Herr Igo Etrich, the originator of the Taube monoplane, with its pigeon-shape wings.

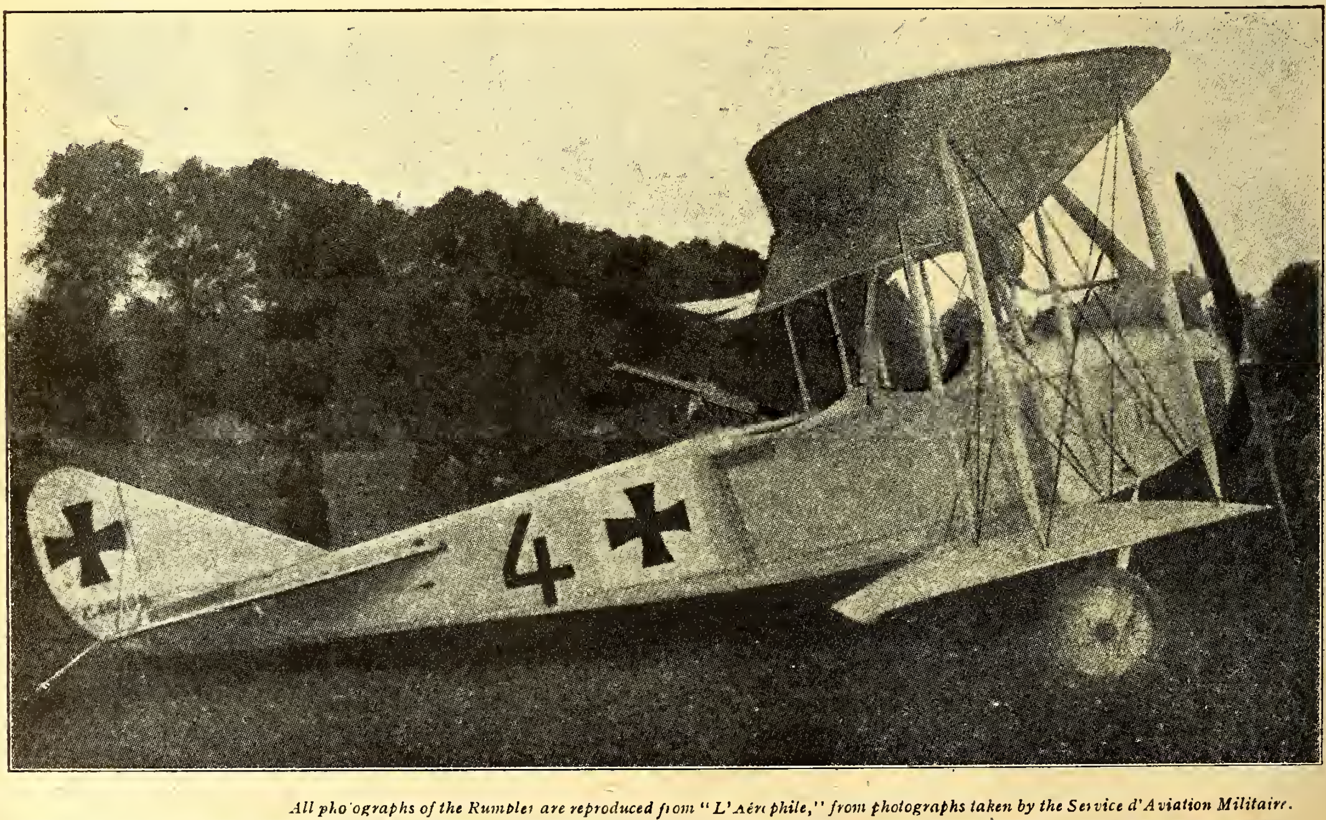
Soon after the beginning of 1914, having fallen out with Herr Etrich, Herr Rumpler produced a monoplane of his own with the general outline of a Taube, but with ailerons instead of warping wing-tips, and with elevators and rudder on the flap system instead of flexing control members.

These machines put up excellent performances in the hands of the famous German aviators, Herren Hirth and Linnekogel. Later on, one of these monoplanes, in fact the very machine on which Herr Linnekogel beat the height record, was rigged up as a biplane, and on it Herr Basser beat the world's duration record by flying for 18 hours and 12 minutes, on June 23rd, 1914, carrying a load of 725 kilos.

On this same machine, Herr Basser made his famous flight from Berlin to Constantinople, stopping only at Budapest and Sofia.

The Early 1915 Type.

The first Rumpler biplane to be captured by the Allies was B.483, shot down on Jan. 10th, 1915, by Gilbert, near Amiens. This machine was a half-way type between the Basser's mongrel



All photographs of the Rumbler are reproduced from "L'Aérophile," from photographs taken by the Service d'Aviation Militaire.

Side View of the 1916 Service Type Rumpler Biplane. The extensive trailing edge should be noted, as also the high rudder and fin.

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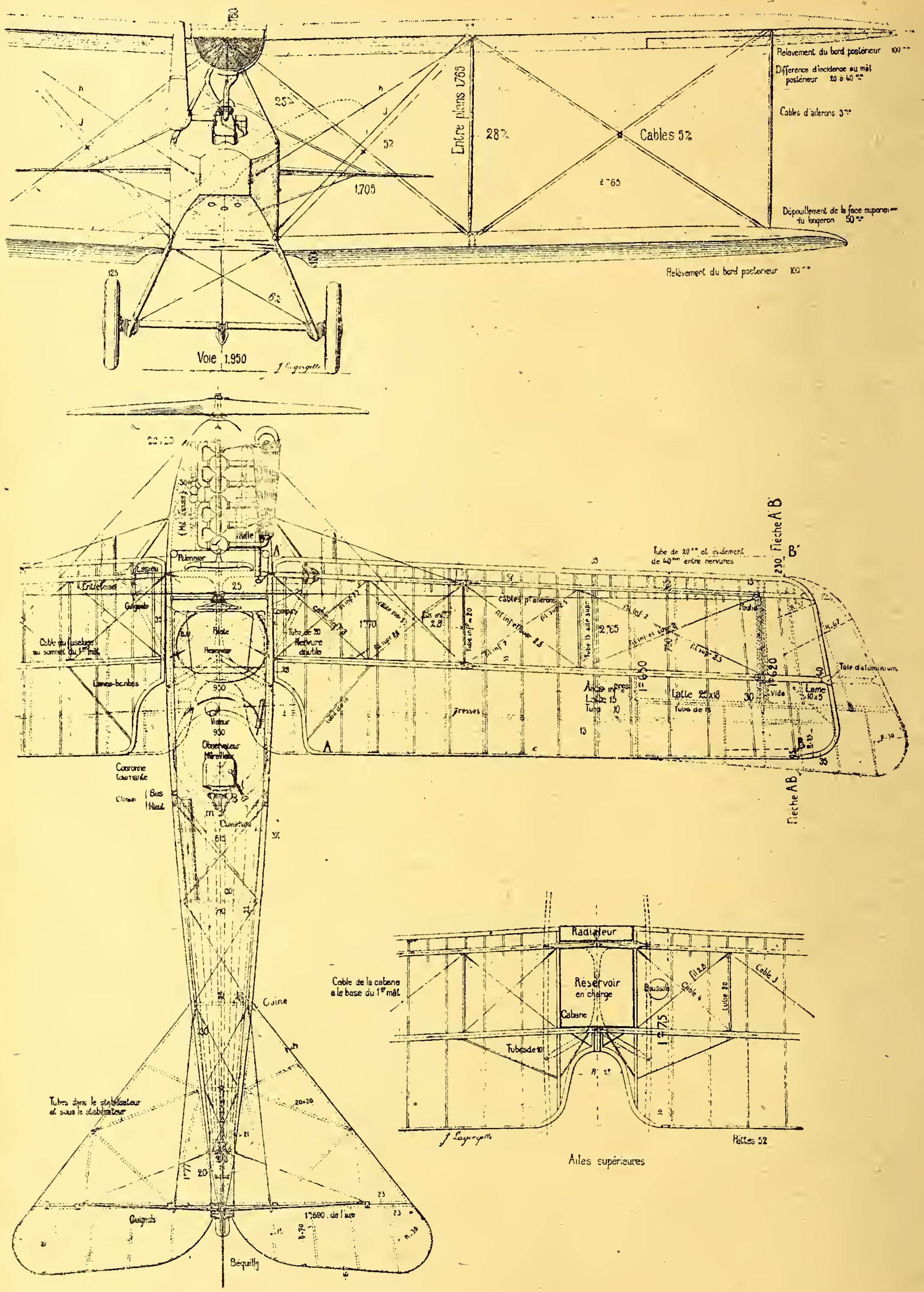

GENERAL PLANS OF THE 1916 TYPE SERVICE RUMPLER BIPLANE. (Drawn by Jean Lagorgette, of "L'Aérophile," to a scale of one-fiftieth).

The leading edges of the wings taper slightly backwards, and they have a slight dihedral angle. The observer-gunner is placed in a gun-ring (couronne tourelle) with the pilot in front. The radiators and tank (reservoir) are in the centre section of the wing, with the compass (boussole) upside down under the right wing. The aileron, upper wing only, is carried on a subsidiary spar (latte). The tail plane (stabilisateur) is built on a frame of steel tubes. The drawings were prepared with the aid of the French Service d'Aviation Militaire.

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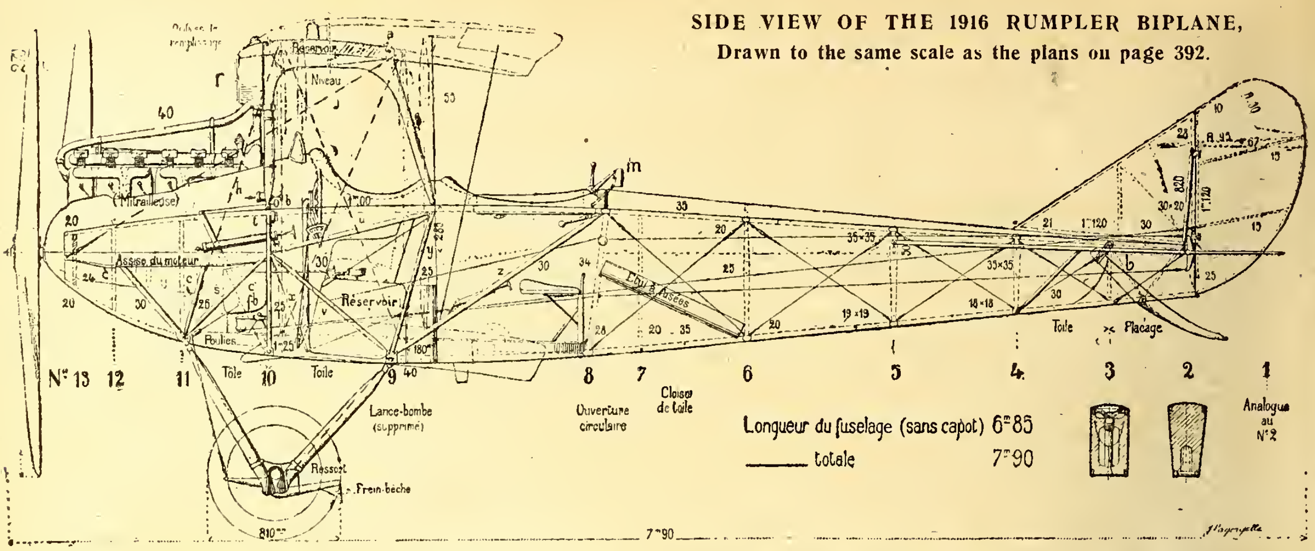
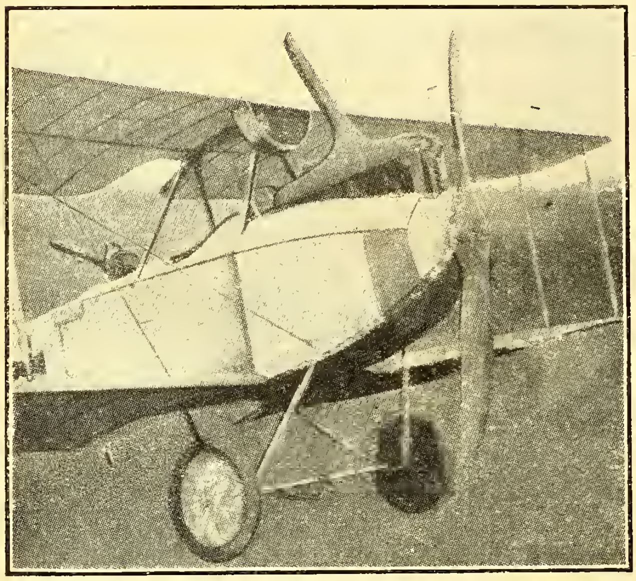


SIDE VIEW OF THE 1916 RUMPLER BIPLANE, Drawn to the same scale as the plans on page 392.



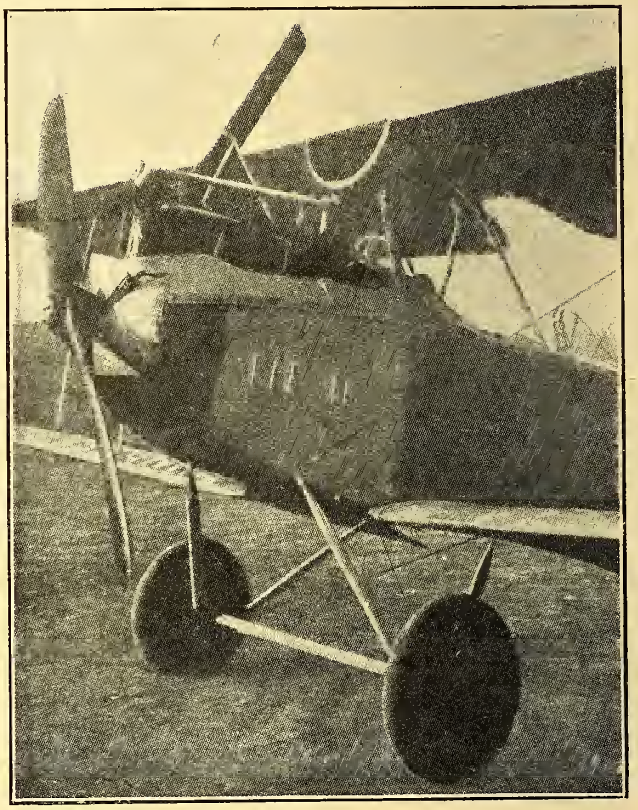
Exhaust Side of a 1916 Type Rumpler Biplane.

monoplane and the type at present in use. It differed chiefly, at sight, in having a flexible trailing edge to the wings, in having the upper edge of the tail-fin curved convexly instead of straight, and in having the upper longitudinals of the body, or fuselage, horizontal to the line or flight instead of tapering downwards to the tail as in the old monoplanes.

The 1916 Type.

Since then a number of other Rumplers have been captured, among them one brought down on May 19th, 1916, which had a single machine-gun mounted on a gun-ring aft, the pilot sitting in front; another one, brought down on Nov. 9th, had two machine-guns, one a fixed gun firing through the propeller, and the other on a gun-ring. Yet another, captured on Nov. 15th, 1916, had a single machine-gun aft, but carried release-gear for six bombs under the fuselage, the machine being intended obviously as a bomber, with a gun for defence only.

It is notable that the majority of German machines captured by the French during 1916 were Rumplers, which does not signify that they are the easiest machines to bring down, but, rather, that the Germans used them in large quantities, and that the Rumpler Factory is well organised for output. Possibly, also, the pick of the German "Destroyers" have been concentrated on the British front.



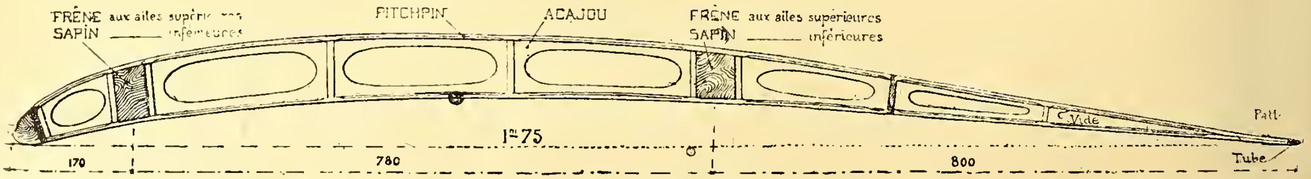
Inlet Side of a 1916 Type Rumpler Biplane.

Comparative Points.

For the sake of comparison one may group these machines in two categories:—Firstly, those of 1914 and the beginning of 1915, and those of the present type, which has been little modified since August, 1915.

The span of the biplanes is less than that of the old monoplanes, so that the surface is much about the same in both types, being between 35 and 38 square metres.

The wings of both categories have a slight backward V, and



A Wing-Rib of a Rumpler Biplane. Spars of Ash (Frêne) in Upper Spar, and Spruce (Sapin) in the Lower Spar. Flanges of Pitch-pine, and Webs of Mahogany (Acajou).

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preserve the bird-like shape, owing to the leading edge tapering backwards, the ailerons being swept back at an angle, and the lower wing tips also projecting backwards.

The butts of the lower wing-spars of the earlier type were fixed under the lower fuselage longitudinals, and not on the side of them, as in the later type.

The upper wing-spars were, and are, fixed on the sides of the fixed centre section of the upper plane.

Following the general trend of evolution in Germany, the main spars of the wings, at first very far apart, have been brought much closer together, chiefly by bringing forward the rear spars, and leaving a very long trailing edge, though this trailing edge is not flexible as in the old German monoplanes.

The ailerons were at first hinged to the rear spars, but instead of making them deeper and shorter as the spars were brought forward, the Rumpler method is to put in a kind of secondary spar behind the rear spar and hinge the aileron on that, thus making the aileron narrower and longer.

The Centre Wing Section.

The number of interplane struts remains the same, four on each side outside the fuselage, thus forming two separate bays, the centre section of the plane being in the older type held by four struts fixed two to each side of the fuselage, whereas in the newer type the wing-spars butt up against a smaller centre section, which is ingeniously composed of the radiator and gravity feed tank for petrol, and is carried on a kind of trestle made of steel tube and sheet metal welded together.

In the older type cables held the wings forward against head-resistance, as well as downward against lifting strains, by joining the nose of the machine to the top of the inner rear interplane strut, consequently the interplane bracing had only to take vertical strains. In the later type, however, crossed fore-and-aft bracing has been introduced between the front and rear struts.

The structure of the wings has been very little altered except that in the later type more ribs are used and the trailing edge is now absolutely rigid, whereas in the older type it was merely stretched along a cord.

Control Planes.

The control planes have also maintained their original disposition and their shape, except that the elevators are somewhat more rounded than at first.

The fixed tail-plane was, and is, triangular as in the 1915 type Albatros, and is fixed practically horizontal to the line of flight without any angle of incidence.

The outer edges of the tail-plane are held about half-way along its length by two tubes to the bottom of the fuselage, and at its rear extremity, where it forms the hinges for the elevator flaps, it is held by two other tubes to the rudder-post, which also forms the rear edge of the fin.

In the earlier types a tail-skid was fitted under the rudder, but apparently in the more recent types the extreme end of the fuselage itself rests on the ground, the edge of the rudder being curved upwards at the bottom to prevent it from being damaged.

Fuselage Structure.

In the later types the front of the fuselage has been generally improved in shape, the engine cowl being neatly rounded off, and the whole body being made a better streamline form.

The upper longitudinal members of the fuselage run forward level with the axis of the motor and consequently level with the engine bearers, all the body-work above them being merely engine cowling or streamline casing for the pilot and passenger. A great deal of steel tube is employed in the internal structure of the fore part of the fuselage.

In the earlier type, apparently, the passenger sat in front, unarmed except for any small-arms he might carry, being presumably solely an observer, and the pilot himself sat at the back. This same arrangement existed on most German aeroplanes, apparently to facilitate observation, except in the Aviatik, where, after having had the pilot in front up to the middle of 1915, he was afterwards placed behind.

The Undercarriage.

The undercarriage, or landing chassis, has remained the same throughout, consisting merely of four tubes, two on each side, connected by a cross axle with the wheels slung on rubber shock-absorbers on a separate axle above the fixed axle. Until well on in 1915 the wheels of these machines were left bare and were not streamline-cased.

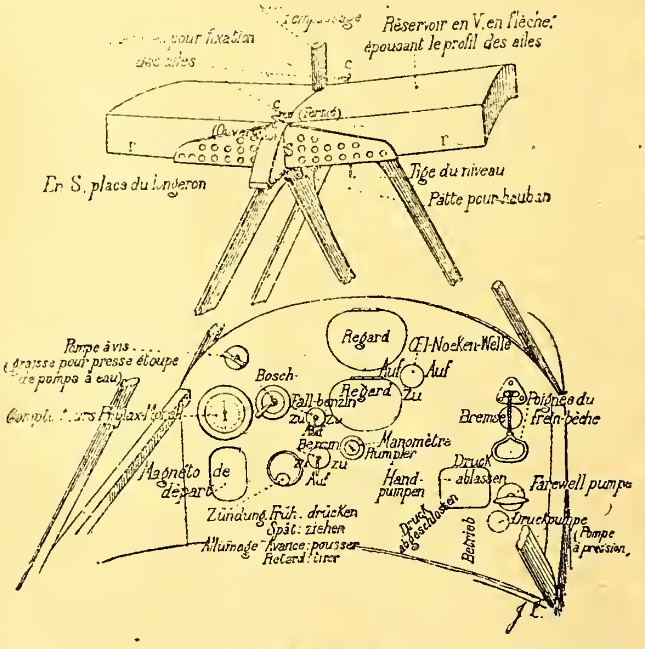
Motors and Fittings.

The motors used have varied both in power and in fittings. The original motor was a Mercédès of 100-120 h.p., with six cylinders cast in pairs; the later types have had 165-175 h.p. Mercédès motors with six separate cylinders.

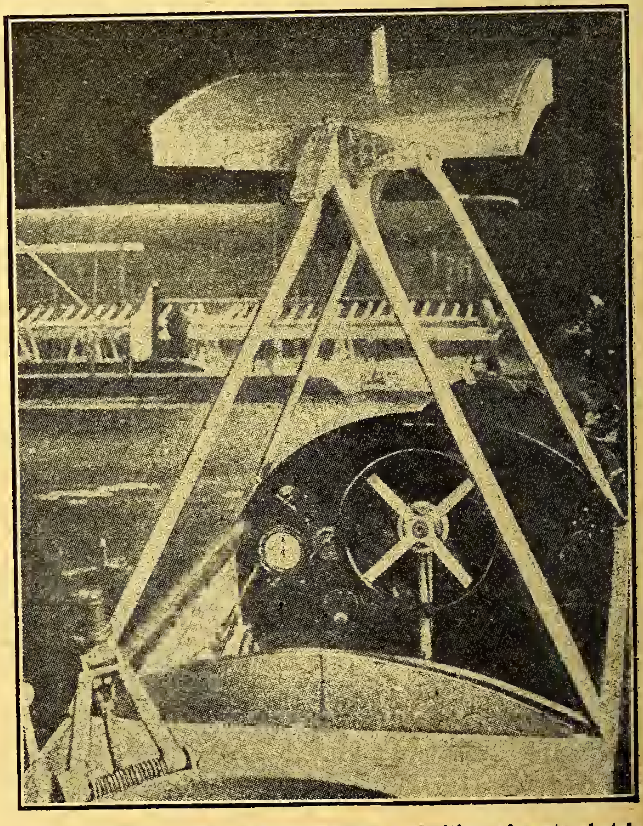
Originally the gravity feed-tanks were ordinary metal barrels slung under the upper plane, but more recently they have taken the form of a streamline scoop built into the fixed centre section of the plane, and placed just behind the honeycomb radiator. In the older types the radiators were of the gilled-tube variety, and were fixed on the side of the fuselage.

In the earlier types the exhaust-pipe pointed downwards, but in the later types it has been carried up over the other plane.

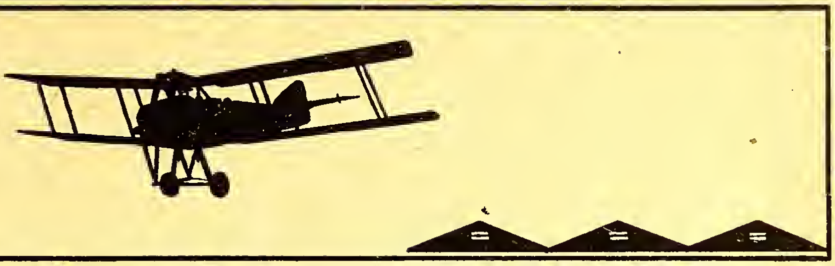
Herr Rumpler seems to have paid considerable attention to detail design, both in the system of attachment of fittings, the



CENTRE SECTION AND COCK-PIT OF RUMPLER BIPLANE.—The Gravity Tank (Reservoir) is V-shaped to fit the wing shape, and the Thumb-Screws (Poignées) for fixing the Wings (Ailes) can be seen fore and aft of its centre, also one of the wiring-plates (Patte pour hanban). The filler pipe (orifice de remplissage) projects above. The Dash-board sketch shows the rev.-indicator (compte-tours), magneto-switch (Bosch), starting magneto (de départ), ignition advance and retard, pressure indicator for main tank (manometre), brake-handle (frein-bèche), and other fittings.



Photograph of Centre Section showing position of parts sketched in the left column.



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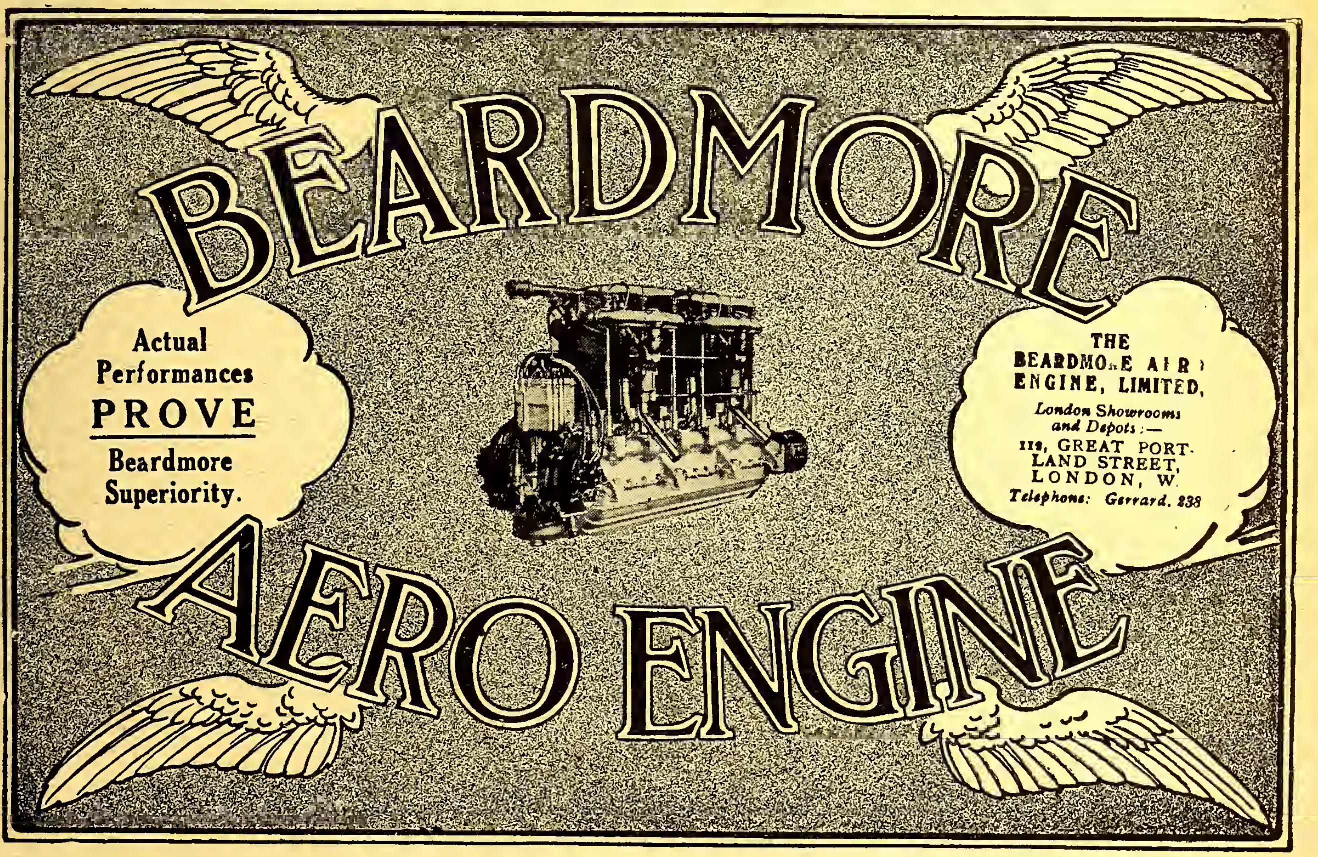

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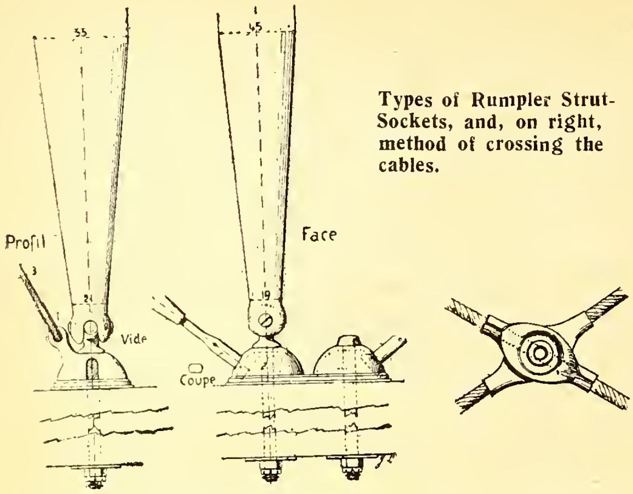


Types of Rumpler Strut-Sockets, and, on right, method of crossing the cables.

facility of mounting and dismounting parts, and to such things as gun fittings and the comfort of the crew.

The total length of the newer Rumpler is 7.9 metres, and its height 3.2 metres. The span of the upper wings is 12.25 metres, and that of the lower wings 11.05; thus the proportion of length to span is greater in the Rumplers than in the Aviatiks or L.V.Gs., but less than in the new Albatros.

Aerodynamic Notes.

Next the fuselage the wings have an angle of incidence of 5 deg. The wing section tapers from the butt of the wing to the tip, and their maximum thickness is 92 mm.

The upper wings have a dihedral angle of 2 deg., the outer forward interplane strut being 160 mm. higher than the corresponding point on the spar at the centre of the machine. The wings are not staggered, the interplane struts being vertical.

The leading and trailing edges of the upper wings are precisely over those of the lower wings except that the ailerons, which are in the upper wings only, project backwards. The gap between the wings is 1.765 metres.

The total surface is 19.36 square metres for the upper plane and 16.15 over the lower plane, or approximately 35.5 square metres altogether, including the ailerons, but not counting the tail.

In plan the wings taper slightly, the chord being 1.75 metres close to the fuselage, and tapering to 1.62 metres, this being apparently the amount which the leading edge is swept back, the spars themselves being parallel and at right angles to the body of the machine.

The span of the tail plane is 3.38 metres. The tail-fin is a triangle 1.12 metres long, and 0.82 metres deep, the rudder standing up to a total height of 1.12 metres from the bottom of the fuselage.

Internal Construction.

In the fuselage the motor is carried on ash engine-bearers, which are held on steel tubes, these themselves being fixed on the summit of the rear struts of the landing carriage.

In the new type the pilot sits in front in a chair-seat on top of the petrol tank close up to the motor, and is protected by a small windscreen. He has a well-fitted instrument-board in front of him.

The passenger now occupies the rear seat, and is seated in the middle of a gun-ring on a swivelling seat.

The four main fuselage longitudinals from the nose of the machine to behind the passenger's seat for a distance of 3.5 metres are of ash, wound spirally with fabric, and behind they are made of spruce, but not wrapped, which is contrary to the custom of other German makers.

The forward ash sections of the longitudinals measure 40 mm. by 30 mm., and the after spruce portions, 20 by 20 mm.

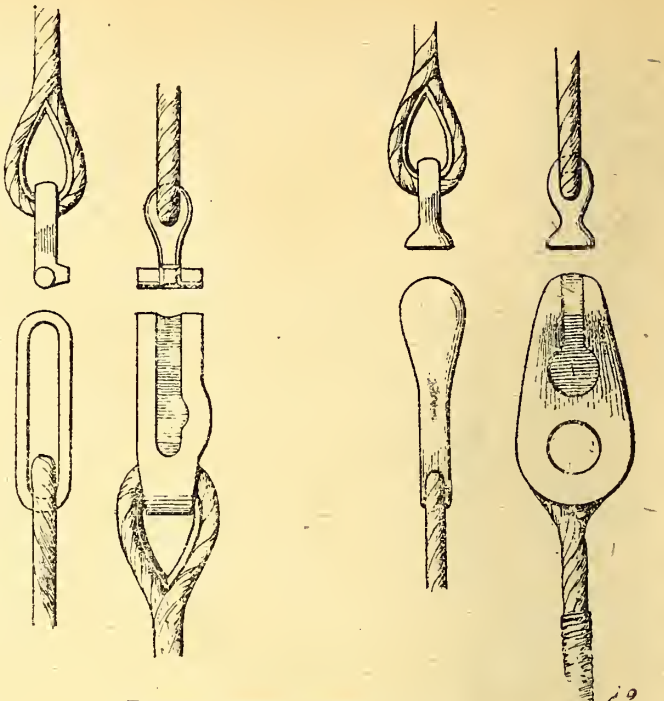
The main struts of the landing carriage are of streamline steel tubing, 95 by 30 mm. section.

The wheel track is 1.95 metres, and the wheels take tyres 810 by 125 mm.

The motor is a Mercédès, and tests of two captured engines showed them as giving between 166 h.p. at 1,400 r.p.m. (motor No. 23,615) and 174 h.p. at 1,450 r.p.m. (motor No. 25,581).

The propeller is driven direct, and of two captured one has a diameter of 280 mm. with 190 mm. pitch (made by Heine, Berlin), and another, labelled "Integral—J.P.W.," has a diameter of 270 mm. and a pitch of 140. The former propeller was made of walnut and mahogany, and the latter of walnut, ash, and sycamore in alternate laminations.

The gravity tank has a capacity of 26 litres and the main tank 195 litres. A three-way tap permits the motor to be fed either under pressure from the main tank, or by gravity.



Types of Rumpler Cable Fixings.

An oil tank is placed on the right of the motor, and has a capacity of 20 litres.

Following are some figures relating to the Rumpler biplanes.

Figures for the 1915-16 Type Rumplers.

	PRE-WAR TYPE	WAR TYPE.
Weight, empty	650 kgs.	830 kgs.
Height	3.20 metres	3.20 metres
Length over all	8.50 metres	7.90 metres
Span (upper plane)	12.25 metres	12.25 metres
Span (lower plane)	11 metres	11 metres.

(A few machines had a span of 13 metres for the upper plane, and 10 metres for the lower plane, which gives about the same surface for the two together.)

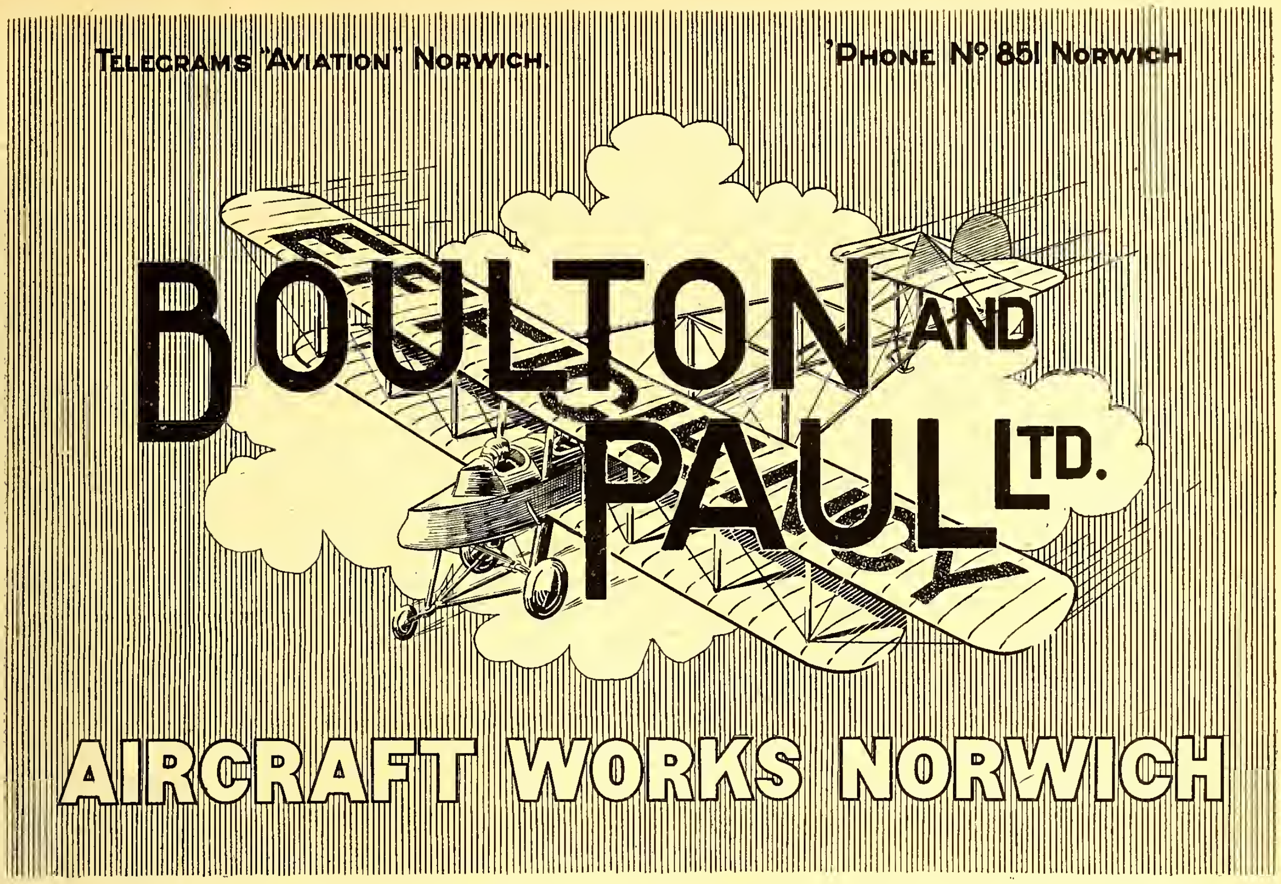
Gap	1.76 metres	1.76 metres
Chord		1.75 metres to 1.62 metres
Surface of wings, 38 sq. metres		35.5 sq. metres.
Fixed Tail Plane		2.25 sq. metres.
Elevators		1.70 sq. metres
Fin		0.45 ,,
Rudder		0.68 ,,

Weights and Loads of the Rumpler.

Weight of	fuselage, wings and tanks	446 kgs.	
,,	wheels	11 ,,	
,,	motor (165 Mercédès)	307 ,,	
,,	water	25 ,,	
,,	propeller	19 ,,	
,,	accessories	20 ,,	
	Total, empty		828 kgs.
,,	fuel and oil	170 ,,	
,,	useful load	263 ,,	
	Total load		433 kgs.
	Total weight		1,261 kgs.

An Acknowledgment.

For these particulars I desire to express my thanks to the *Redacteur en Chef* of that excellent paper, "L'Aérophile," and his able and studious contributor, M. Jean Lagorgette, whose original article, from which these notes are taken, contains a mass of other detail. Also, I wish to acknowledge the indebtedness of the readers of this paper to the French Military Authorities, who, apparently, make a practice of furnishing the technical staff of "L'Aérophile" with photographs and detailed particulars of the latest captured German aeroplanes, for the edification and education of the French Aircraft Industry. This is a wise policy which cannot fail to be of great advantage to French designers and constructors, and I trust that the British Aircraft Industry will feel duly recognisant of its indebtedness to the *Service d'Aviation Militaire*—albeit the information is second-hand, and may have suffered in transference from the original expressive French to very matter-of-fact English.—C. G. G.



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A NEW SOURCE OF SUPPLY.

A pianoforte factory is not unsuited, from several points of view, for adaptation as an aeroplane works. In the first place pianos contain wires which have to be tuned, and so do aeroplanes. But, speaking seriously, much of the work in the pianoforte is analogous to that in an aeroplane, and practically all the machinery employed is adaptable for aircraft work.

An up-to-date pianoforte works contains a large and varied assortment of power machines, including band-saws, spindle-machines, automatic wood and metal working lathes of all kinds, planing machines, and sandpapering machines. Also the general lay-out of a pianoforte works lends itself readily to conversion to an aircraft works.

The founders of the London Aeroplane Co. are therefore fortunate in the possession of a well-equipped pianoforte works at Lower Clapton, which they are now busily engaged in transforming, although the work of making pianofortes is at present still going on in some departments. The idea is to merge the new business into the old, until finally the musical instrument side of the concern entirely disappears, at any rate, for the time being.

The proprietors intend to keep the existing highly organised staff together until such time as it can be fully employed on aircraft construction. The available staff consists of several hundred hands, the major portion being women, practically all of whom have taken up the work since the commencement of the war.

The manufacture of aircraft parts is actually now in process, and it will not be very long before the whole of the resources of the factory are concentrated upon the new business. It is interesting to note that the factory in question was the only English firm in the country to make absolutely every part in its peace-time products, including even pianoforte pegs, bolts and screws.

The general manager of the new company is Mr. J. J. Morch, who has had considerable aircraft and motor experience both in England and Denmark. With the magnificent factory equipment at his disposal Mr. Morch cannot fail to assist the output of war aircraft very considerably. The firm has already been entrusted with several contracts, but it will be pleased to receive further inquiries, as possibly other contracts may be worked off concurrently with those now in hand.

HEAVY FUEL AND LUBRICATION.

The necessity for using paraffin and other fuels of high specific gravity and flash point in many car and lorry engines has created new problems in lubrication. With the best carburation devices it is almost impossible to ensure complete combustion, with the result that a certain amount of liquid fuel is bound to mix with the lubricating oil, and ultimately to pass the pistons into the crank-case and ultimately into the main bearings of the engine. Under these conditions, the quality of the lubricating oil is a very important factor, as its properties may either combat or assist the ill effects of the paraffin on the bearings.

Recent experiments made with a Crossley car running on a mixture of three parts of Red Line No. 2 spirit with two parts of paraffin, in conjunction with Wakefield Castrol "C" Lubricant (summer grade), were very successful. After a run of 2,500 miles the engine was taken down and all the main bearings were found to be in very good condition. An illustration of the two halves of a big end bearing and half of a main bearing appears below.

Personal experience with Wakefield's Castrol in cars and motor-cycles bears out the firm's claims to the wonderful properties of their various lubricating oils, and the writer has never come across an aviator who complained of the quality of the Castrol lubricants specially prepared for aircraft work.—W. L. W

A NEW WORKS MAGAZINE.

The Blackburn Aeroplane Company, Ltd., Leeds, have added their name to the list of aircraft firms who now possess House Magazines.

The intention of the new magazine, which is known as "The Olympian," is to cater for the interests of the staff and employees of the firm. The first number, which is a highly creditable effort, appears for February, and successive numbers will appear monthly.

Naturally, most of the allusions are largely local in character, but the uninitiated can glean sufficient of what runs between the lines to understand that the magazine must be of absorbing interest to those "in the know,"

An item of special interest is an excellent photograph of Mr. Robert Blackburn, the founder of the firm, and one of the pioneers of British aviation. There is also the first instalment of what seems likely to be a very educative article on Aeroplane Design

Another article of interest is a series of notes concerning the present position of various pilots who flew the Blackburn machine in pre-war days. The doings of Mr. (now Captain) B. C. Hucks are recalled, as are the flights by Lieut. (now Wing-Commander) Spenser Grey, R.N., Mr. (now Major) Conway Jenkins, Mr. (ex-Flight Lieut.) Sydney Pickles, and Mr. (now Major) Harold Blackburn. One also learns that Mr. Rowland Ding, late of Windermere, is now the firm's test pilot, and is doing much flying of a noteworthy character, if one dared record it publicly.

The chief criticism which is likely to be made on the magazine is its price, for despite the quality of the matter, 3d. may seem a good deal to ask for a magazine of 16 pages. However, writing as a newspaper man, with one eye on the price of paper, which has already broken all altitude records, one can say that in view of the fact that there are no advertisements and that the circulation must be limited, there cannot be any change out of that threepenny-bit. However, as the circulation grows, doubtless the size of the magazine will grow with it, and anyhow the editor is to be heartily congratulated on the first issue.

A WAR NECESSITY.

Bowden Wire, Ltd., regret to announce that, being wholly engaged upon production for the British and Allied Governments, they are unable to execute any orders for private purposes until further notice. They have in stock certain goods suitable for replacements. Customers are invited to state their requirements in this respect, and, if possible, these will be met. Orders for complete air inlets cannot be filled.

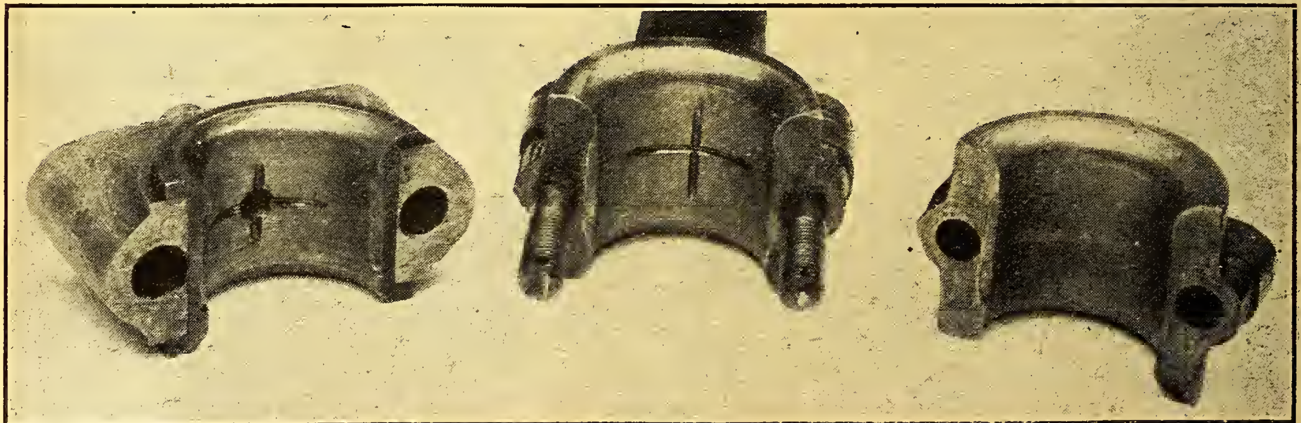
A CHANGE OF OCCUPATION.

Messrs. Barningham, whose premises in Albany Street, N.W., were so well known as "Friswell's," have purchased some 150 acres of ground at Kingsbury, N.W., for the purpose of an aerodrome, and have erected thereon a well-equipped aeroplane factory. Incidentally, they are erecting what is believed to be the largest hangar in this country.

When more peaceful times arrive a country flying and sporting club will be opened. Nowadays the factories are busy on Government work. The title of the new company will be the Kingsbury Aviation Company. London offices are at 175, Piccadilly, W.

METAL WORK REQUIRED.

Aeroplane constructors who find difficulty in executing orders for metal parts are strongly recommended to get in touch with Henry J. Brewster and Co., of 11, Queen Victoria Street, E.C. This firm is in a position to commence any kind of machine tool work at a moment's notice.



An Interesting Example of the Effect of Good Lubrication. Two big-end bearings and a main bearing of a Crossley Car, after 2,500 miles running on heavy fuel, with Castrol as a lubricant.

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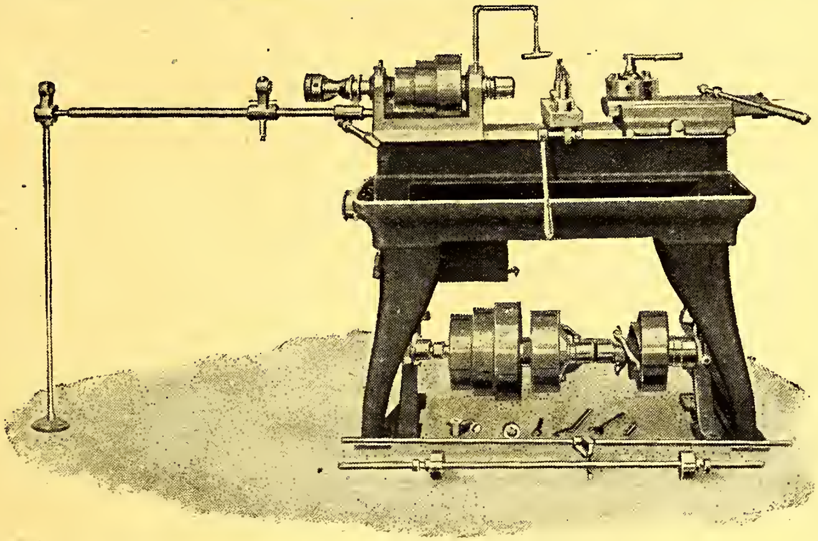

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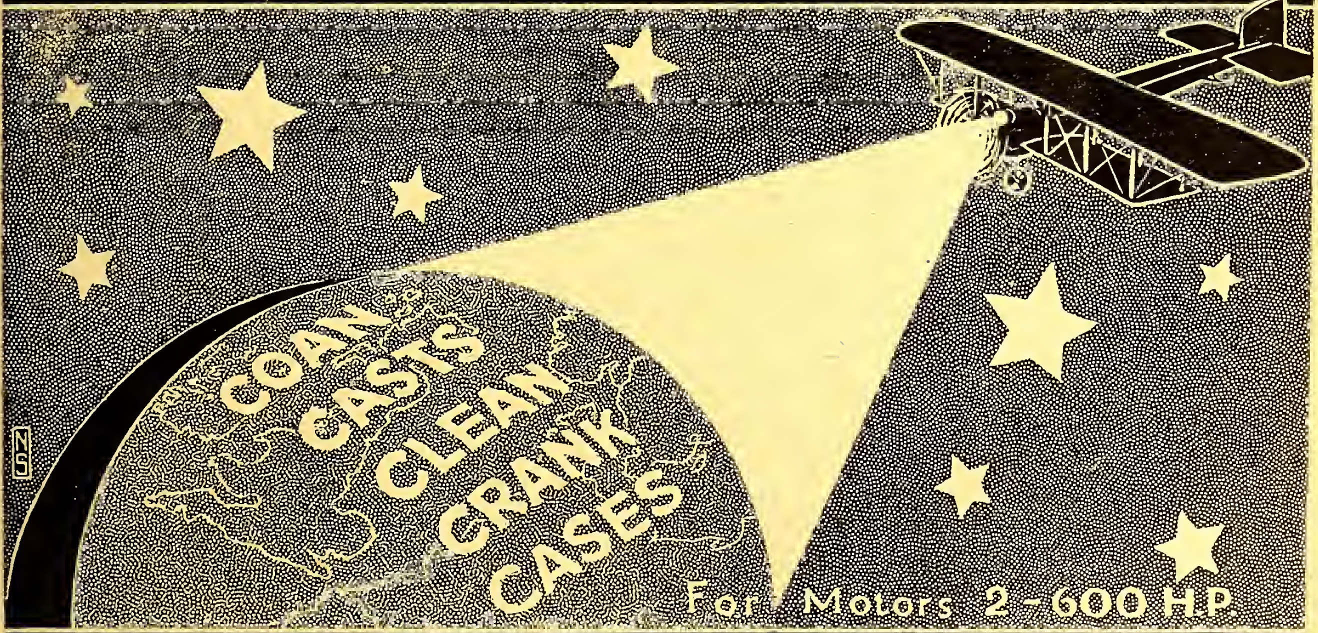
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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

1916 IN REVIEW.

(*Continued from page* 336.)

THE DEMANDS OF SERVICE.

Full comprehension of Service conditions and consequent essentials, in my opinion, inclines one to the belief that it is chiefly the war-necessity to which the Salmson has so admirably responded, chiefly in the hands of French mechanics, rather than the perfect agreement of its design with those conditions.

Nobody, of course, expects entire perfection. Still our endeavour is to find its nearest approach, to appraise the degree of merit attained, and choose accordingly. Now precisely what are those conditions? I should say that for naval or coastal use, with a supply ship or a depot ashore, replete with labour and spares—rarely as the need for either might arise, as in this case—one may well admit that it would be difficult to find a better than the Salmson or more than a few so good.

THE DIFFERENCES THEREOF.

Military conditions, on the other hand, seem to bring out inherent type-defects—otherwise negligible—into clearer view. There is a lot of this motor, in width and bulk, wholly irreducible. Consequently irreducible weight. Incidentally, it is water-cooled. This, no doubt, assures reliability, but undeniably adds more weight, including that of the radiators, if not also an auxiliary water-tank.

These inevitables, however, might well be provided for, and so off-set that the usefulness of the whole flying machine might not be lessened. All the actual Service efficiency would thus be maintained. But that is not all. First, last and all the time in a land campaign we have transport to consider. Every cubic foot of space grudged that might be devoted to other stores or munitions. Every possible ounce cut for the sake of more rapid mobility.

THE DEFECT: AND WHY.

From this aspect, then—if no other—the Salmson design, in one point at least, appears defective. Observe now that the spout-like connections from the water-jackets each run out at a different angle, and from a point in the jacket different from the next in series. It is difficult to see how the general connection and circulation system could be arranged otherwise without interfering with other no less important features of the design-scheme.

But what is the result? Each motor must have an outfit of at least nine spare cylinders. These will not nest compactly like flower-pots, and so take up their full cubic space. Yet in a military sense, the whole nine count as but one spare. Imagine, then, the nine-fold weight and bulk to drag about. Also imagine—since warfare is five-parts office work to one of fighting—the indent for such an outfit!

THE LIMITATIONS OF THE RADIAL.

Therefore the Anzani or the Isaacson—not because either is a better motor—but as an air-cooled proposition with every unit detail about it—except certain internals—the duplicate of the next, seems to score for military use. Yet as a radial with no particularly intensive system of cooling—such as the American Kemp has, and to a less degree the Renault also—and no special variation of design calculated to increase efficiency, 10 h.p. per cylinder seems to be the nominal maximum for either. As to the actuality, I cannot speak from personal witness of brake-test or flying test. And the various Anzani models up to 20 cylinders are to-day—according to the best information obtainable—precisely as they were in 1914. Among them, however, I have not yet heard of one of 200 h.p.

Frankly, I think they represent the best that can be done with the radial type. Which is not saying that we cannot choose a better. On the contrary, we must, for the demand is for something nearer 400 h.p. already, just to be going on with. Therefore—quite incidentally—I cannot see the advantage of the St. Andrew's cross propositions of Trebert of the U.S., and others.

PROJECTS AND POSSIBILITIES.

Such motors would be merely double Vs when all is said—both the V and Y have their own imperfections, hardly overcome—and as such would present more delicate problems in lubrication than their projectors seem to anticipate, if one may judge from design detail.

Why pile mechanism upon mechanism with repeated units: when all alike must induce their mixture, or be lubricated, from a single source? When, too—should it consequently become necessary to duplicate source or system—fresh physical difficulties are bound to follow.

Why not rather strike out for a simpler design—the simplest obtainable for the given power-output efficiency—with less mechanism, and try for greater power straightforwardly, as by some increase or variation of the dimensions of that design? The margin is so much wider and the execution plainer. There is so much better chance of weight-stripping in detail. Useful spaces are created here and there by the extra half-inch dimension, where none existed formerly.

Yet, paradoxically, greater opportunities occur for compacting, in proportion to the increase of the main factors of bore and stroke. Withal, physical probabilities are easier to anticipate from previous practice.

THE VERTICAL GROUP.

Turning to the vertical group, the demand for power combined with a sufficiently low petrol and oil consumption to ensure a long flying-radius—for the larger biplanes and monoplanes alike—had revived this type for aviation long before the war. Nowhere so strongly as in Germany, though the fact conveyed no warning.

So, to quote only two instances, we saw the longest non-stop "raid" ever undertaken on the Continent up to that time, comfortably achieved with a Benz of six cylinders; and one still more sensational was Herr Friedrich's Berlin-Paris-Hendon-and back two-stage flight on an Etrich monoplane: as usual fitted with a six-cylinder Austro-Daimler of some 100 h.p.

Long before the war, however, Beardmore's, Ltd., had acquired the sole British rights for this motor. Except for such an accessory as its Friedmann-Bosch lubricator, its design probably did not embody a single patent; as it was nothing more than an elaboration of the Prince Henry, Semmering-Hill model of the same make, all on well-known lines.

THE FAVOURITE.

Yet it is said that £10,000 was paid—on results, justifiably, no doubt—for the working drawings of this aviation model. Just before the war, too, the Skoda Works had completed a V-type duplicate; also said to be a masterpiece of motor construction; of which, however, singularly enough, no production appears to have occurred since.

So the Beardmore Company simply carried on with the design they had bought—and its enlargement to 160 h.p.—as their two standard models. Which have so remained ever since; and also as probably the two finest of their type-group produced anywhere

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in England, and the most besought by war-contracting aeroplane manufacturers, as well as of pilots.

AND THE FORLORN CAPTIVE.

The Benz models, too, remain, practically in all details, to-day as in 1914. They are deservedly favourties within the arch-enemy State. They became so at a bound, since the above-mentioned "raid" performance early in 1913; though, of course, as with us, war-necessity has made all possible use of every other—such as the Mercédes, the Argus, and the N.A.G.—for which a like reliability could be claimed.

As a matter of fact, from the spring of 1913—when we were entertaining the ponderously amiable and observant Prince Henry—the entire Benz output of aero-motors was commandeered; and they became at once unprocurable in this country.

Thus it happens that a Benz motor is quite frequently the power-plant of the larger machines we capture. Which is fortunate—as their production—possible from the actual example by dozens, any time during the last fifteen months—is now more than overdue, though possibly still "under serious consideration."

So, too, with the Mercédès and others. If we must imitate for want of time to initiate newer or better designs of our own—the abilities of Farnborough being happily no criterion of our talents—it would seem just as well to produce from war-gift designs instead of paying enormous royalties outside the country.

All the more, since we have dozens of engineering firms still unemployed and advertising for work, whose skill and plant is more than capable of both the needful output and quality combined. At any rate, the Benz model for one will bear reproduction without modification; unless possibly—and advisedly, as I have always contended—to make its valves detachable with their seatings.

THE SECRET WONDER.

Another interesting vertical of enemy design—practically the most interesting novelty of the year in four-stroke practice—is the six-cylinder Maybach, of which the power should be somewhere about 240 h.p. This motor—which was identical in type—if not in size—with the unseen model of the emergency fourth car of the German Grand Prix team, that occasion having been used for its final trial—represents in the main, not so much a novelty as an ingenious reversion to the design of the original Spyker motors; the heads only having drum-shaped water-jackets, flange-united to the next: a system which gives practically monobloc rigidity and compactness, with the advantage—of great Service value—of unit-construction.

This feature, at any rate, combined with a clever, compact water-abstraction and re-delivery device, and jet-controlled carburation from each end of an omnibus-type induction, comprised the entire variation from ordinary vertical-type design. The multiple-valving was no novelty, having been demonstrated often enough on French track-racers, and also on Metallurgique racing and semi-racing models, not to mention Sunbeams.

In this case, also—and from more captured models than the Zeppelin fragments displayed—an opportunity exists for wholesale reproduction. No doubt airship propulsion is not the same thing from the motor standpoint as aeroplane-traction. But having stood up for the former after such a trial as the Circuit roads gave this model, the experiment should be worth trying. As I say, we have the skill and material.

FRENCH VERTICALS.

Since the last Aero Show. we have seen nothing of the interesting Dansette-Gillet four and six-cylinder models, with their concentric valves. That type of valve has never yet received the attention I consider it deserved, in this case or that of the Panhard. Possibly prejudice against the merely uncommon, as usual, checked the production of both types before and since 1914.

Be that as it may, the former make does not appear to have borne any part in French war-aviation. Nor the latter, for that matter, at any rate, not in that particular model. So great a pioneer firm as Panhards—conservative though it ever was—could hardly have been neglected.

Also, there are numerous other sectors of the French Front than those of the Somme district from which aviation news does not come so freely. Thus, while one hears of great aero-motor developments at the Avenue des Acacias, even up to 600 h.p. V-type, one does not gather that there are many Panhards in actual use.

Yet no firm in France, with all their experience by road and afloat of high-quality motor-production, should have been better able to turn out the finest and most reliable of aero-motors. In fact, the only other French firm I know equally distinguished is MM. Delahaye and Company. In whose case, nevertheless, the standing wonder of the past ten years—let alone since the war—is that they have never attempted aero-motor production at all!

(To be continued.)

New Patents.

This list is specially compiled for THE AEROPLANE by Messrs. Rayner and Co., Registered Patent Agents, of 5, Chancery Lane, London, from whom all information relating to Patents, Designs, Trade Marks, etc., can be obtained gratuitously.

LATEST PATENT APPLICATIONS.

561. R. O. Pryce. Propeller for aircraft. 11/1/17.
492. H. Smith. Aeroplanes. 10/1/17.
790. J. Gridley. Frames of Aircraft. 16/1/17.
755. R. Courtois Suffit. Inclination indicators for aircraft, etc. 15/1/17.
1286. L. Goldmerstein. Aeroplanes. 25/1/17.
1135. J. R. Little. Movable airship shed. 23/1/17.
1216. W. H. Nosworthy. Aerial Propellers. 24/1/17.

SPECIFICATIONS ACCEPTED THIS WEEK.

103,342. T. D. Kelly. Propeller Shafts.
103,400. A. A. Holle, A. W. Judge, and Varioplane Co., Planes and the like for aeroplanes.

SPECIFICATIONS PUBLISHED THIS WEEK.

17,850. Carcano. Flying-machines.
103,242. J. T. Parker. Armoured aeroplanes.
103,277. F. H. Royce, B. I. Day, and Rolls-Royce, Ltd. Swivelling propellers for aircraft.

LATEST PUBLISHED ABSTRACT.

102,261. Aeroplanes, etc. Curtiss Motor Co.

In aeroplanes, etc., the seats are arranged symmetrically fore and aft of the centre of pressure of the supporting-planes, the power units are disposed symmetrically about the longitudinal centre line of the machine, and the fuel-tank, ammunition-chest, and other variable loads are arranged as near as possible to, and approximately symmetrical about, a vertical line through the centre of pressure, in order to provide a well-balanced structure. The nacelle has portions extending well fore and aft of the main planes, and provided with seats, the front seat providing an unobstructed observation range and gun fire, are of at least 160 degrees vertically and horizontally. One or more propellers are arranged between the front seat and the planes, and are driven by motors in stream-line casings.

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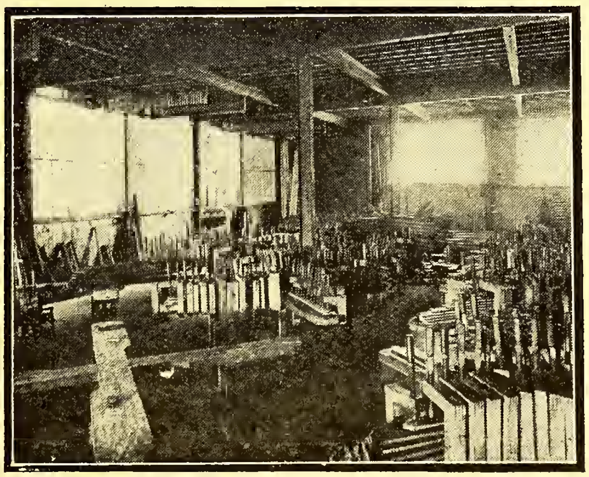

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British & Colonial Aeroplane Co., Ltd. (The Bristol Co.), Filton, Bristol.
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British Wright Co., Ltd., 33, Chancery Lane, W.C.
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Davidson Aero Co., Ltd., Hammersmith, W.
Eastbourne Aviation Co., Ltd., Eastbourne
Handley Page, Ltd., 110, Cricklewood Lane, N.W.
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Mann, Egerton & Co., Aircraft Works, Norwich
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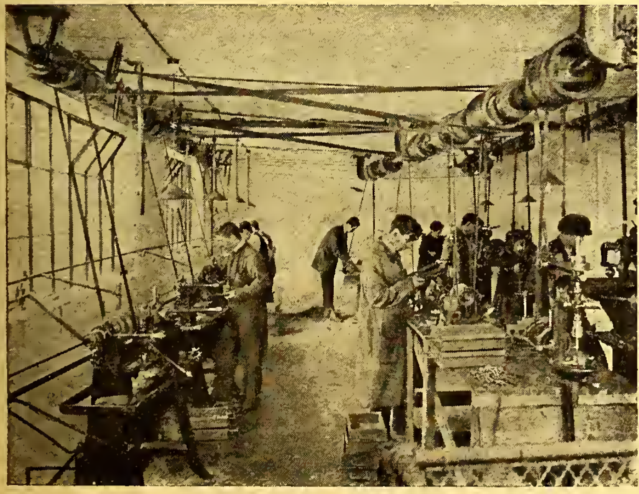

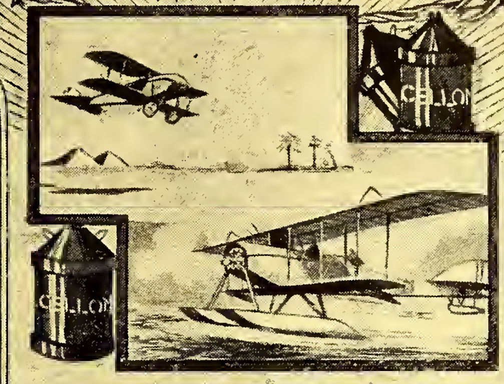

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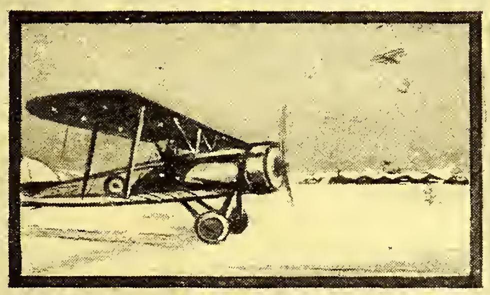

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(Continued from page 384)

Shelmerdine, Res. of Officers, from an Adjt., R.F.C., Dec. 28th, 1916.

Group Comdrs.—From Wing Comdrs., and to be temp. Cols. whilst so empld. :—Maj. (temp. Lt.-Col.) H. C. T. Dowding, R.A. ; Capt. (temp. Lt.-Col.) P. L. W. Herbert, Notts and Derby R. ; Maj. (temp. Lt.-Col.) R. E. T. Hogg, C.I.E., 38th Central India Horse, Ind. Army, Jan. 1st.

Sqdn. Comdrs.—From Flt. Comdrs., and to be temp. Majs. whilst so empld. :—Temp. Lt. (temp. Capt.) R. S. Maxwell, Gen. List, Dec. 18th, 1916. Temp. Sec. Lt. (temp. Capt.) G. B. Ward, M.C., Gen. List, Dec. 27th, 1916.

Flt. Comdr.—Capt. J. H. C. Minchin, Sco. Rif., from a Flying Officer, Jan. 2nd.

Flying Officers.—Temp. Capt. J. H. Storey, S. Lan. R., and to be transfd. to Gen. List, Dec. 19th, 1916; temp. Sec. Lt. H. M. K. Brown, attd. Arg. and Suth'd. Highrs., and to be transfd. to Gen. List, Dec. 20th, 1916; Capt. E. H. Bedson, Lan. Fus., T.F. ; Sec. Lt. G. G. Crutchley, Lond. R., T.F., Dec. 23rd, 1916; temp. Sec. Lt. W. M. Roskelly, attd. W. York R., and to be transfd. to Gen. List, Dec. 24th, 1916; Capt. C. P. Bertie, Lond. Brig., R.F.A., T.F. ; Lt. J. McC. Elliott, Canadian Gen. List, Jan. 13th ; temp. Sec. Lt. (on prob.) C. L. Gunnery, Gen. List, Jan. 14th ; temp. Sec. Lt. C. B. Fenton, Gen. List ; temp. Lt. D. B. Davies, Welsh R., and to be transfd. to Gen. List ; Sec. Lt. P. D. Baker, Home Counties (Cinque Ports) Brig., R.F.A., T.F. ; Sec. Lt. J. A. Leutit, Camb. R., T.F. ; temp. Sec. Lt. L. E. Vine, Gen. List ; temp. Sec. Lt. D. Nelson, Gen. List, Jan. 16th.

Depot Comdrs.—From Park Comdrs., and to be temp. Lt.-Cols. whilst so empld. :—Maj. D. G. Conner, R.A. ; Qrmr. and Hon. Lt. (temp. Maj.) F. H. Kirby, V.C., R.F.C., Jan. 1st.

Park Comdrs.—Temp. Lts. (temp. Capts.), Army Ord. Dept., to be transfd. to Gen. List, and to be temp. Majs. whilst so empld. :—L. P. Walker, W. H. Lang, Jan. 1st.

Equipt. Officers, 1st Cl.—Temp. Lts., Army Ord. Dept., to be transfd. to Gen. List, and to be temp. Capts. whilst so empld. : G. Stevens, F. B. Pulham, H. J. Newton-Clare, R. G. L. Candy, Jan. 1st.

2nd Cl.—Temp. Lts., Army Ord Dept., and to be transfd. to Gen. List :—F. J. Baker, V. E. Faning, G. W. Lee-Barber, L. G. T. Sedgwick, M. G. Dashwood, F. C. O. Shaw, C. H. Nathan, G. E. Morris, T. de la Poer Beresford, R. W. Seldon, L. G. Harber, W. B. Carnley, Jan. 1st.

3rd Cl.—Lt. D. T. W. Manwell, Australian Flying Corps, Nov. 18th, 1916. Temp. Sec. Lt. H. C. Roberts, E. York R., and to be transfd. to Gen. List, Dec. 9th, 1916. Sec. Lt. H. R. South, Spec. Res., Dec. 14th, 1916. Temp. Lt. J. A. Stone, A. Ord. Dept., and to be transfd to Gen. List ; temp. Sec. Lt. G. H. Wilson, Gen. List ; temp. Lt. H. L. Crichton, A. Ord. Dept., and to be transfd. to Gen. List ; temp. Sec. Lt (on prob.) B. G. White, R.E. ; temp. Sec. Lt. (on prob.) B. W. M. Williams, A. Ord. Dept., and to be transfd. to Gen. List, Jan. 1st. Sec. Lt. A. T. Griffith, Spec. Res. ; temp. Sec. Lts. (on prob.) C. J. Geddes, R. G. Fussell, and F. Grattan ; temp. Sec. Lts. A. Gane and P. R. Garner ; temp. Sec. Lts. (on prob.) J. G. Beckham, G. E. Bower, and W. R. P. Allen ; temp. Sec. Lts. E. E. Beaumont and F. Briggs, all Gen. List ; Sec. Lt. E. G. Buck, Spec. Res. ; temp. Sec. Lts. (on prob.) S. Frost and E. R. Danks ; temp. Sec. Lts G. J. Enguell, D. H. Etheridge, and E. C. Frisby, all Gen. List ; Sec. Lt. W. S. Farley, Spec. Res. ; temp. Sec. Lt. F. E. Smyth, Gen. List ; Lt. M. Skitt, R.F.A., Spec. Res. ; temp. Sec. Lt. (on prob.) C. A. Stevenson, Gen. List ; Sec. Lt. J. H. Secker, Spec. Res. ; temp. Sec. Lts. D. C. Sutherland, F. M. Thomas, L. P. Timmins, and temp. Sec. Lts. (on prob.) J. Watson and L. E. Yeomans, all Gen. List ; Sec. Lts. A. G. Stradling, O. L. Vetter, S. J. Vine, and S. Wilson, Spec. Res. ; temp. Sec. Lts. (on prob.) H. McG. Wood, S. Jolley, and F. P. Lambert, Gen. List ; Sec. Lt. C. Groves, Spec. Res. ; temp. Sec. Lts. A. Hodgkins and A. Howard, Gen. List ; Sec. Lt. C. J. S. Holden, Spec. Res. ; temp. Sec. Lts. (on prob.) C. H. Mendham, W. Le Lorraine, and N. Liddall, Gen. List ; temp. Sec. Lt. R. Leake, Gen. List ; Sec. Lts. S. G. Linssen, F. D. Lugard, and H. W. Prockter, Spec. Res. ; temp. Sec. Lt. R. Rainford, Gen. List ; Sec. Lts. J. D. Riohards, R. Rochford, and E. P. Proud, Spec. Res. ; temp. Sec. Lt. W. J. Rice, attd. Welsh R., and to be transfd. to Gen. List, Jan. 10th. Temp. Lts., A. Ord. Dept., and to be transfd. to Gen. List :—W. E. Cowie, F. G. J. Didden, J. P. Ross, F. N. Downey, H. A. Whelen, Jan. 1st.

Memoranda.—Sub-Lt. S. Wyborn, from R.N.V.R., to be temp. Lt. on Gen. List for duty with R.F.C., Dec. 26th, 1916.

To be temp. Lts. while serving with R.F.C., Jan. 1st :—

Sec. Lts. :—E. A. Packe, Oxf. and Bucks L.I. ; F. Jefcoate, Suff. R. ; D. G. B. Jardine, High. L.I. ; J. Gilmour, Arg. and Suth'd Highrs. ; W. L. Fenwick, Linc. R. ; F. Egerton, 17th Lrs. ; R. A. Denne, Wilts R. ; F. A. Coward, R.W. Surr. R. ; A. I. Campbell-Robertson, 18th Hrs. ; V. J. Whitaker, Linc. R., Spec. Res. ; R. D. Sampson, Worc. R., Spec. Res.

Temp. Sec. Lts. :—G. E. Gibbs, Wilts R. ; E. A. Worrall, H G. Waterall, F. J. Terrell, M. L. Taylor, L. L. Richardson, C. T. Richards, J. W. Lawlor, R. V. Kann, F. F. Holliday, A. H. Gearing, A. D. Finney, G. R. A. Deacon, P. H. Davy, G. S. Bush, H. D. Addis.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. W. E. Holland is secd. for duty with the R.F.C., Jan. 13th.

Sec. Lt. C. Cadman is secd. for duty with the R.F.C., Jan. 17th.

R.F.A.—Sec. Lt. P. D. Baker is secd. for duty with the R.F.C., Jan. 16th.

Capt. C. P. Bertie is secd. for duty with the R.F.C., Jan. 13th.

Sec. Lt. H. Welch is secd. for duty with the R.F.C., Jan. 11th.

Sec. Lt. (temp. Lt.) R. C. Allen is secd. for duty with the R.F.C., Jan. 18th.

R.E.—Sec. Lt. J. E. Taylor is secd. for duty with the R.F.C., Jan. 13th.

Infantry.—R. Suss. R.—Sec. Lt. F. S. Young is secd. for duty with the R.F.C., Dec. 30th, 1916.

Hamps. R.—Sec. Lt. R. J. Stubington to be temp. Lt. whilst serving with the R.F.C., Jan. 1st.

Somerset L.I.—Sec. Lt. W. J. Gayner is secd. for duty with the R.F.C., Dec. 29th, 1916.

Northampton R.—Sec. Lt. H. B. T. Hope to be temp. Lt. whilst serving with the R.F.C., Jan. 1st.

Lond. R.—Sec. Lt. E. T. Curling to be temp. Lt. whilst serving with the R.F.C., Jan. 1st.

* * *

From the "London Gazette" Supplement, Feb. 3rd, 1917.

War Office, Feb. 3rd.

REGULAR FORCES—Staff.—Hd.-qrs. of Admin. Servs. and Depts.—The follg. temp. appt. is made at the War Office :—

Staff Lt.—Temp. Sec. Lt. D. Blairman, Gen. List, from an Equipment Officer, 3rd Cl., R.F.C., vice Lt. N. C. F. Francis, R.F.C., Spec. Res., Jan. 4th.

Establishments.—R.F.C.—Military Wing :—

Sqdn. Comdr.—Sec. Lt. (temp. Capt.) K. T. Dowding, R.W. Surr. R., T.F., from a Flight Comdr., and to be temp. Major whilst so employed, Jan. 17th.

Flying Officers.—Sec. Lt. T. Elder-Hearn, Spec. Res., Dec. 19th, 1916. Sec. Lt. B. King, Yorks, L.I., Spec. Res., and to be secd. ; Ses. Lt. S. J. Stocks, S. Lan. R., Spec. Res., and to be secd. ; Sec. Lt. A. C. Young, Spec. Res. ; Temp. Sec. Lt. D. P. Collis, Gen. List ; Temp. Sec. Lt. J. W. Brown, Gen. List ; Temp. Sec. Lt. A. I. Riley, Gen. List, Jan. 14th.

Adjutant.—Capt. S. O. Everitt, Res. of Officers, Jan. 6th.

Park Comdrs.—From Equipment Officers, 1st Cl., and to be temp. Majors whilst so empld :—Qrmr. and Hon. Lt. (temp. Capt.) S. J. Payne, R.F.C., Jan. 1st. Lt. (temp. Capt.) F. S. Creswell, Spec. Res., Jan. 12th. Lt. (temp. Capt.) L. M. Bennett, Spec. Res., Jan. 26th.

Experimental Officer, 1st. Cl.—(Graded as an Equipment Officer, 1st Cl.).—Temp. Lt. H. T. Tizard, Gen. List, from a Flying Officer, and to be temp. Capt. whilst so employed, Jan. 11th.

Memoranda.—To be temp. Lts. whilst serving with R.F.C.—Temp. Sec. Lt. L. A. Hardwick-Terry, R.E. ; Sec. Lt. O. T. Walton, S. Lan. R., Spec. Res. ; Temp. Sec. Lt. F. L. Kitchin, attd. Glouc. R. ; Temp. Sec. Lt. J. G. Francis ; Temp. Sec. Lt. T. Shepard, attd. R. War. R., Jan. 1st.

Actg.-Sgt. R. B. Herring, from R.F.C., to be temp. Sec. Lt. (on prob.), for duty with Mil. Wing of that Corps, Jan. 19th.

Gen. List.—Cdts. to be temp. Sec. Lts. (on prob.) for duty with R.F.C. :—E. E. Arbery, T. W. Abbott, J. K. H. Arnold, T. P. Ashby, F. A. Biner, F. L. Bristow, C. H. Bartlett, W. G. Birnie, J. Bryson, W. E. Bywater, R. H. Baylis, C. L. Beaumont, A. O. Bigg-Wither, A. R. Baker, J A. A. Bouie, A. C. Cowlin, S. Coates, H. J. Curtis, E. C. Chapman, R. E. Conder, G. S. Chester, G. E. Cayford, G. M. W. G. Cato, A. J. Cassidy, A. S. Caldwell, J. H. Dand, L. V. Dennis, J. R. Drummond, M. D. Draper, H. N. G. Dann, W. W. Dingle, N. P. Davis, J. N. Eastcott, E. P. P. Edmonds, A. J. S. Doble, H. J. Edwards, G. S. Ellis, A. R. Felton, C. T. Felton, A. R. Fairbairn, M. E. Faithfull, H. A. Francis, J. B. Finch, C. W. McL. Gray, F. L. Goldby, R. R. Goding, L. H. Gamble, S. V. L. Gedge, G. T. F. Hunter, J. A. Higham, W. M. M. Hurley, N. W. Hustings, G. N. Hunstone, C. A. Hargreaves, D. A. G. Hasleham, L. O. Harel, A. Hepburn, A. S. Harris, R. P. Hood, G. V. Howard, D. H. Houston, E. F. Haselden, E. D. Jennings, A. G. N. Jones, H. V. Jones, S. M. Johnson, A. Jackson, F. B. Jones, J. L. King, A. G. Knight, R. C. Lovell, D. Latimer, D. L. Lynn, A. W. Long, C. A. Lewis, W. J. Mussared, G. Murray, C. S. Macgregor, L. A. McPherson, D. A. J. Munro, E. Mull, W. T. G. Moss, R. Massey, C. A. McCreath, J. V. Martyn, M. A. Millar, F. T. Muncey, E. G. Nuding, S. H. Pilling, L. H. Paddle, A. R. Paul, A. F. Percy, C. R. Perring, L. M. Quelch, W. Robson, H. B. Redler, W. R. Rogers, R. A. Robinson, P. C. Ross, F. E. Richardson, C. G. V. Runnels-Moss, G. A. Rose, A. B. Shilstone, J. B. Sanderson, W. S. C. Smith, S. M. Spurway, H. E. Sheppard, J. R. Spearing, F. H. St. C. Sargant, H. Spurrier, F. P. D. Scott, R. I. Simpkin, T. E. Smith, W. B. Smellie, C. Smith, H. P. Trussell, E. R. Taylor, G. G. Tomling, T. L. Tebbit, H. D. Turner, C. C. T. Turner, A. A. Tigar, C. W. Usher, M. West-Thompson, D. R. M. Wright, F. H. Woolliams, J. E. Wood, T. M.

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* * *

From the "London Gazette" Supplement, Feb. 5th, 1917.

War Office, Feb. 5th.

REGULAR FORCES.—The following Wt., N.C.Os., and men to be temp. Sec. Lts.:—

Memoranda.—For duty with R.F.C.:—Cpl. M. Lewis, from R.E., Jan. 10th. Pte. A. D. Collins, from Lond. R., T.F.; Pte. H. J. Bennett, from Can. A.S.C., Jan. 14th.

Establishments.—R.F.C.—Wing Comdrs.—From Squadron Comdrs. and to be temp Lt.-Cols. whilst so employed:—Major A. B. Burdett, D.S.O., York and Lancs R.; Capt. (temp. Major) W. G. S. Mitchell, M.C., High. L.I., Dec. 18th, 1916. Capt. (temp. Major) H. Le M. Brock, D.S.O., R. War. R., Dec. 27th, 1916. Capt. (temp. Major) E. N. Fuller, Spec. Res., Jan. 2nd.

Flying Officers.—Sec. Lt. H. N. Loch, 8th Gurkha Rif., Ind. Army; temp. Sec Lt. G. A. Cocks, Garr. Bn., Ches., R., and to be transfd. to Gen. List, Dec. 28th, 1916. Sec. Lt. W. J. Gayner, Som. L.I., T.F.; temp. Sec. Lt. C. P. Lowry, Gen. List, Dec. 29th, 1916. Temp. Sec. Lt. G. Le B. Diamond, attd. Essex R.; Sec. Lt. (on prob.) D. Mitchell, Sco. Rif., Spec. Res., and to be secd.; Sec. Lt. L. H. Forrest, 47th Sikhs, Ind. Army; Sec. Lt. W. A. Coates, Australian Flying Corps, Dec. 31st, 1916.

Balloon Officers.—Sec. Lt T. G. Beale, 2nd D.G., and to be secd., Oct. 27th, 1916. Sec. Lt. J. R. Hembrough, Spec. Res., from an Equipment Officer, 3rd Cl., Dec. 19th, 1916. Sec. Lt. F. S. Young, R. Suss. R., T.F., Dec. 30th, 1916. Temp. Sec. Lt. J. R. Newland, attd. Gord. Highrs., Jan. 2nd, 1917.

Depot Comdrs.—Capt. (temp. Major) A. Christie, R.A., from a D.A.Q.M.G., and to be temp. Lt.-Col. whilst so employed, Dec. 19th, 1916.

Park Comdr.—Sec. Lt. (temp. Capt.) C. G. Smith, Spec. Res., from an Equipment Officer, 1st Cl., and to be temp. Major whilst so employed, Dec. 26th, 1916.

Equipment Officers, 1st Cl.—From 2nd Cl., and to be temp. Capts. whilst so employed.—Temp. Lt. A. S. Ellerton, Gen. List, Dec 19th, 1916. Lt. W. H. Day, Hamps R., Dec. 30th, 1916. Sec. Lt. (temp. Lt.) G. I. N. Deane, Tyne Electrical Engrs., R.E., T.F., from the 2nd Cl., and to be temp. Capt. whilst so employed, Jan. 1st. From the 2nd Cl., and to be temp. Capts. whilst so employed.— Sec. Lt. (temp. Lt.) S. Davenport, Spec. Res.; Temp. Lt. J. W. Burt, Gen. List; Temp. Lt. J. R. Grant, Gen. List; Sec. Lt. (temp. Lt.) J. L. Luntley, Spec. Res.; Temp. Lt. T. F. G. Strubell, Gen. List, from a Special Appt. (graded as an Equipment Officer, 2nd Cl.) and to be temp. Capt. whilst so employed, Jan 9th. Sec. Lt. C. R. Huggins, Spec. Res., from the 3rd. Cl., and to be temp. Capt. whilst so employed, Jan. 13th.

2nd Cl.—Temp. Capt. L. Sadler, A.S.C., from a Staff Capt., Jan. 1st. From the 3rd Cl.—Temp. Lt. H. B. Denton, Gen. List, Jan. 9th. Lt. B. V. Grealy, Spec. Res., Jan. 10th.

3rd Cl.—Sec. Lt. F. T. McElwee, Gen. List, Jan. 1st. Temp. Sec. Lt. (on prob.) L. A. Owen, attd. Hamps R.; Sec. Lt. A. R. Mitchell, Spec. Res.; Sec. Lt. S. A. Mitchell, Spec. Res.; Sec. Lt. W. G. Murray, Spec. Res.; Sec. Lt. L. S. Pape, Spec. Res., Jan. 10th. Sec. Lt. C. Cadman, Yorks Dns. Yeo., T.F.; Temp. Sec. Lt. S. T. Fradd, Gen. List, Jan. 17th.

Experimental Officers, 2nd Cl.—(Graded as an Equipment Officer, 2nd Cl.).—Sec. Lt. F. A. Harper, Spec. Res., from 3rd Cl., and to be temp. Lt. whilst so employed, Jan. 1st.

3rd. Cl.—(Graded as an Equipment Officer, 3rd Cl.).—Sec. Lt. H. H. Chivers, S.R., Dec. 4th, 1916.

Special Appointment.—(Graded as an Equipment Officer, 2nd Cl.).—Sec. Lt. H. G. Gold, S.R., from an Equipment Officer, 3rd Cl., and to be temp. Lt. whilst so employed, vice temp. Lt. T. F. G. Strubell, Gen. List, Jan. 9th.

Memoranda.—The following to be temp. Lt -Cols. whilst employed as Wing Comdrs., R.N.A.S., Dec. 31st, 1916:—Capt. (temp. Major) J. N. Fletcher, R.E., Capt. temp. Major) J. D. Mackworth, R. W. Surr. R.

Sec. Lt. (on prob.) W. H. A. Heald, R. Fus., S.R., to be temp. Lt. whilst serving with R.F.C., Jan. 1st.

Sec. Lt. (on prob.) H. H. Leage, from R.F.C., S.R., to be temp. Lt. on Gen. List (without Army pay and allowances) whilst employed as an Asst. Inspr., Aeronautical Inspn. Dept., Dec. 13th, 1916.

SPECIAL RESERVE OF OFFICERS.—Foot Guards.—C. Gds.—R. S. W. Dickinson, D.S.O., from Flt. Sub-Lt., Royal Navy, to be Sec. Lt., Feb. 5th, with seny. from July 12th, 1915.

TERRITORIAL FORCE.—R.F.A.—Sec. Lt. (temp. Lt.) R. C. Allen is secd. for duty with R.F.C., Jan. 18th, 1916.

Infantry.—Essex R.—Sec. Lt. E. F. Haylock is secd. for duty with the R.F.C., Jan. 18th.

* * *

FROM COURT CIRCULAR.

Buckingham Palace, Feb. 5th.

The following Officer had the honour of being received by the King, when His Majesty Invested him with the Insignia of Companion of the Order into which he has been admitted:—

The Distinguished Service Order.

Maj. Sidney Smith, R.F.C.

Capt. Arthur Gordon-Kidd, Dragoon Guards and R.F.C.

The Military Cross.

Capt. Keith Binning, R.F.C.
Capt. William Birch, Yorkshire Regt. and R.F.C.
Capt. Robert Gould, R.F.C.
Capt. William Kennedy-Cochran-Patrick, R.F.C.
Capt. John Tyssen, R.F.C.
Lt. Francis Alford, Canadian Machine Corps, attd. R.F.C.
Lt. Phillip Purser, Army Service Corps and R.F.C.
Sec. Lt. Clifford Busk, Suffolk Regt. and R.F.C.

NAVAL.

The following appointments have been made in the Royal Naval Air Service:—

Jan. 31st.—Lt. (temp.).—E. Childers, promoted to Lt.-Comdr. (temp.), seny. Dec. 31st.

[This is apparently an example of clerical carelessness at the Admiralty in notifying appointments to the Press, as Lieut.-Commander Childers appears in the "Gazette" of Jan. 30th as R.N.V.R., whereas in the appointment list he appears under the R.N.A.S. heading without any qualification.—Ed.]

Feb. 2nd.—The following Sub-Lts. (R.N.V.R., temp.) have been promoted to Lts. (temp.), seny. as stated:—W. C. C. Sykes, Jan. 22nd; C. F. Yeomans, E. S. Sturdee, and W. W. Farthing, all Jan. 30th.

The following have been granted temp. commissions as Sub-Lt. (R.N.V.R.), seny. Jan. 30th:—P.O. (R.N.V.R.) C. S. Goddard and A.B. (R.N.V.R.) W. T. Morris.

Ch. P.Os.—H. J. Grant (pensioned) and H. Stafford, both granted rank of Actg Gunner (temp.), seny. Jan. 29th.

Feb. 3rd.—Flt. Sub-Lt.—J. A. Barron, promoted to Flt. Lt., seny. Oct. 1st.

Sub-Lts. (R.N.V.R. temp.).—G. C. A. G. Nicholson and C. P. Sheppard, both entered as Proby. Flt. Officers (temp.), seny. Jan. 30th, and apptd. to "President," addl., for R.N.A.S.

Temp. commns. (R.N.V.R.) have been granted to the following, seny. Feb. 1st, and all appointed to "President," addl., for R.N.A.S.

Lieuts.—H. A. Dawson, A. A. Sutton, R. G. B. Bird, N. D. Newall, and S. Henderson. Sub-Lts.—W. R. Horsfield and E. D. Densham.

Feb. 6th.—Proby. Flt. Officer (Temp.).—C. H. Keith, promoted to Flt. Sub-Lt. (temp.), seny. Oct. 10th.

Lt. (Canadian General List).—H. H. Reade, entered as Proby. Flt. Officer (temp.), seny. Feb. 3rd.

The Casualty List.

Reported Jan. 31st.

Missing.—Mackenzie, Flt. Comdr. Colin R., D.S.O., R.N.

Previously reported Killed, now reported a Prisoner.—Moon, Flt. Comdr. Edwin R., R.N.

PERSONAL NOTICES.

Engagement.

JONES—ROBERTS.—The engagement is announced of Squadron-Commander Robert Hilton Jones, R.N., only son of Mr. and Mrs. Robert Jones, late of Cilmynach, Barmouth, and Eileen, only daughter of Colonel Astley Roberts, R.F.A., and Mrs. Astley Roberts, Badlesmere, Eastbourne.

Marriage.

BIRKBECK—ELLIOT.—The Bishop of Oxford officiated at St. Barnabas's Church, Pimlico, on Feb. 3rd, at the marriage of Lettie, only daughter of Mr. and Mrs. Hugh Elliot, of Byfleet, Surrey, with Flight Sub-Lieut. Michael Birkbeck, R.N., son of the late Mr. William John Birkbeck, of Stratton Strawless, Norwich. The Bishop wore his full ecclesiastical robes, including the cope and mitre of Russian cloth-of-gold presented to Bishop Sheepshanks, of Norwich, by the late Mr. Birkbeck, and worn by him at the Coronation of King Edward VII. Miss Elliot, who was given away by her father, had a pearl embroidered white net gown over silver tissue, with a long train of similar material, sewn with pearls. A fillet of pearls was arranged over the simple tulle veil, and she carried a sheaf of Madonna lilies.

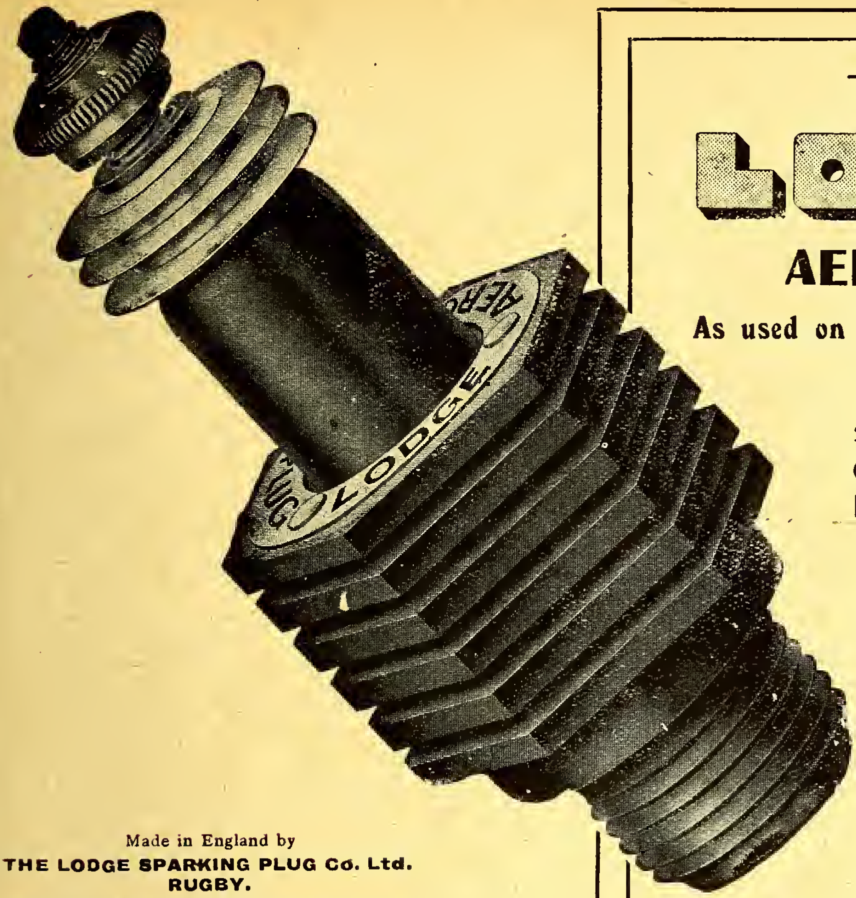
Births.

HICKS.—On Jan. 31st, at Heron Lodge, Worcester, the wife of Squadron Commander W. C. Hicks, R.N., of a son.

* * *

SMITH.—On Jan. 30th, at 35, Bangalore Street, Putney, the wife of E. Coleman Smith, R.N.A.S., of a son.

Those who have served with him in the R.N.A.S. will be glad to learn that Flight-Commander Rollo Moon is not permanently lost, as was reported on Jan. 12th. News was received that the seaplane in which Flight-Commander Moon and Commander the Hon. R. O. B. Bridgeman, D.S.O., R.N., were flying had been shot down. A fortnight or so ago it was reported that one of them had managed to swim ashore. Later it was ascertained that Flight-Commander Moon was the officer saved, and that he had been made prisoner.



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MILITARY.

G.H.Q. COMMUNIQUÉS.

JAN. 30th, 8.35 p.m.—Successful bombing operations were carried out by our aeroplanes on the night of Jan. 28th-29th.

In the course of air fights, three German machines were destroyed yesterday, and three others driven down damaged.

FEB. 2nd, 8.40 p.m.—Clearer weather led to increased activity in the air yesterday, and much useful work was done by our aeroplanes. Four of our machines are missing.

FEB. 3rd, 8.30 p.m.—A number of fights took place in the air yesterday, in the course of which two German aeroplanes were destroyed and two others driven down damaged. Three of our machines are missing.

FEB. 5th, 9.35 p.m.—Three German aeroplanes were destroyed yesterday as a result of air fighting, and six others were driven down damaged. One of our aeroplanes is missing.

* * *

WAR OFFICE COMMUNIQUÉ.

The General Officer Commanding the British Forces in Mesopotamia reports:—

FEB. 3rd.—On the morning of the 1st one of our aeroplanes shot down a Fokker, which crashed to the ground from a height of 7,000 ft.

THE CASUALTY LIST.

Reported Jan. 31st.

KILLED.—Hay, Sec. Lt. J., R.F.C.

WOUNDED.—Northcote, Sec. Lt. T. F., Cavalry S.R., attd. R.F.C.

MISSING.—Cody, Sec. Lt. S. F., R.F.C.

Lyle, Sec. Lt. J. V., R.F.C.

DIED.—R.F.C.—Brown, 43830 2nd Cl. Air Mech. J. A. W. (Tottenham Court Road, W.)

Newman, 22807 2nd Cl. Air Mech. A. W. (Kilburn, N.W.).

Reported Feb. 1st.

DIED OF WOUNDS.—Stewart, Lt. N. W., R. Scots and R.F.C.

WOUNDED.—Beaulah, Capt. E. A., Lincoln R. and R.F.C.

Denison, Sec. Lt. A., R.F.C.

McArthur, Capt. J., R.F.C.

MISSING.—Greig, Capt. O., R.F.C.

MacLennan, Sec. Lt. J. E., Cameronians, attd. R.F.C.

Matthews, Sec. Lt. H., R.F.C.

White, Lt. R. W., Canadian Gen. List, attd. R.F.C.

WOUNDED.—R.F.C.—Ajderian, 36383 2nd Cl. Air Mech. L. (Manchester).

Reported Feb. 2nd.

KILLED.—Waters, Sec. Lt. E. G., Yeomanry and R.F.C.

WOUNDED.—Rusby, Capt. R. H., Gloucester Regt. and R.F.C.

MISSING.—Alder, Sec. Lt. S., R.F.C.

Preston, Sec. Lt. T. F., Yeomanry and R.F.C.

Reported Feb. 3rd.

WOUNDED.—Hollingsworth, Sec. Lt. P. C., R.F.C.

Houghton, Sec. Lt. J. R., Warwick R. and R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED OF WOUNDS AS A PRISONER IN GERMAN HANDS.—Wynn, Sec. Lt. A. E., R.F.C.

PREVIOUSLY REPORTED WOUNDED AND A PRISONER, NOW REPORTED DIED OF WOUNDS AS A PRISONER IN GERMAN HANDS.—Patterson, Sec. Lt. A. F. A., R.F.C.

Reported Feb. 5th.

KILLED.—Young, Sec. Lt. D. W. L., R.F.C.

WOUNDED.—Barker, Sec. Lt. A. F., Hampshire Regt., attd. R.F.C.

Blenkiron, Sec. Lt. A. V., Somerset L.I., attd. R.F.C.

Butler, Sec. Lt. H., R.F.C.

Cole, Lieut. B. S., R.F.C.

Fauvel, Sec. Lt. L. G., R.F.C.

Golding, Lt. H. M., Gloucester Regt., attd. R.F.C.

Herbert, Sec. Lt. E. G., R.F.C.

MISSING.—Bird, Lt. C. B., M.C., R.F.A., attd. R.F.C.

Johnson, Sec. Lt. P. C. E., R.F.C.

Russell, Sec. Lt. F. G., R.F.A., attd. R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONERS IN GERMAN HANDS.—Hollis, Lt. J. A., E. Yorks Regt., attd. R.F.C.

Windrum, Lt. C. H., R.W. Kent Regt., attd. R.F.C.

CORRECTION.—OFFICER MISSING.—MacLennan, Sec. Lt. J. E., Cameronians, attd. R.F.C. (reported missing), should read: MacLennan, Lt. J. E., Cameronians, attd. R.F.C.

WOUNDED.—R.F.C.—Best, 10726 1st Cl. Air Mech. A. (Jarvis Brook).

Callaghan, 16398 2nd Cl. Air Mech. W. J. (Westminster, S.W.).

Drew, 24977 Sgt. J. (Birmingham).

Reported Feb. 6th.

WOUNDED.—Clarke, Sec. Lt. A. W., R.F.C.

Gower, Lt. W. E., Sherwood Foresters, attd. R.F.C.

Matthews, Sec Lt. A., R.F.C.

Whistler, Sec. Lt. A. H., Dorset Regt., attd. R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONERS IN GERMAN HANDS.—Corbett, Sec. Lt. R., Yeomanry and R.F.C.

Lees, Sec. Lt. J. C., R. Scots Fus. and R.F.C.

INDIAN FORCES.—MISSING.—Buck, Lt. C. M., I.A. Res. of Officers, attd. R.F.C.

PERSONAL NOTICES

DEATHS.

FIRBANK.—Lt. Godfrey B. J. Firbank, R.F.C., aged 22, eldest son of Mr. and Mrs. Godfrey Firbank, of Aldwick Court, Wrington, Somerset, who has been missing since Sept. 11th, is now reported to have been killed, the American Embassy, Berlin, stating that his machine was shot down in an air battle on that day, the aeroplane wrecked, and the occupants killed. Mr. Firbank was educated at St. Peter's, Weston-super-Mare, and at Clifton College. When war broke out he was farming in South Africa. He at once joined the Eastern Rifles, and served during the rebellion in South Africa and with General Botha's Army in German South-West Africa. When the campaign ended he came home, was gazetted to the Welsh Regiment, and at the end of December, 1915, transferred to the R.F.C. His Squadron Commander writes:—"He was a most gallant officer, very popular in the squadron, and had done a lot of very good work indeed."

* * *

GOODDEN.—At the inquest on Jan. 30th upon the body of Major F. W. Goodden, killed on Jan. 28th, it was stated that he was flying a new type of machine, at Farnborough, which had not been used by anyone but himself. Before it went up the machine was closely inspected both by expert mechanics and by Major Goodden. He had reached a height of about 1,000 feet when one of the wings was seen to break away, and the machine fell headlong to the ground. The injuries to Major Goodden must have caused instant death. The jury returned a verdict of death by accident.

Unofficial reports stated that he was looping the loop, and that the breakage occurred at the top of the loop. From this one might possibly deduce that the machine reached that point without sufficient speed to produce the centrifugal force necessary to maintain the load on the flying wires, and that in consequence the nose of the machine dropped while it was upside down and threw the load suddenly onto the landing wires. In such a case, with a heavy engine, the landing wires might snap and then the wings would inevitably collapse in the direction which would be downwards if the machine were right side up.

* * *

HALL.—Sec. Lieut. Gilbert S. Hall, R.F.C., only son of Mr. and Mrs. Robert Hall, of Greenaleigh, Matlock, died of wounds in an enemy hospital at Cambrai on Nov. 30th last. Born in 1891, he was educated at Mill Hill School, and was a graduate of the Institution of Mechanical Engineers. He joined the R.F.C. in Nov., 1915, and after training went to the front in May, 1916. While on patrol work his machine was shot down, the observer being killed at once. Mr. Hall died of his injuries ten days later. His commanding officer writes that "he was a most capable and efficient officer," and that he was "much missed by his brother officers." He was well known in motoring circles.

* * *

HAY.—Sec. Lt. John Hay, R.F.C., killed in action on Jan. 23rd, was the elder son of the late William Hay, of Gunningbar, N.S.W., and was 28 years of age.

* * *

HODGSON.—An inquest was held on Jan. 30th at the Cambridge Military Hospital on 2nd Cl. Air Mech. Hodgson, R.F.C., who was killed on Jan. 29th. It was stated in evidence that the aeroplane went up on Farnborough Common, flying against an easterly wind. The pilot did not appear to get his machine up into the air quickly enough, for as it was crossing the Farnborough road it appeared as if it would foul the tops of some trees there. To avoid doing so, the pilot turned the machine sharply to the left, and so apparently brought about the accident, for the turn was too sharp, and the machine, banking at a steep angle, fell with a crash to the ground from a height of about 100 ft. Hodgson died soon after reaching the hospital, and the officer who was with him was very seriously injured. A verdict of accidental death was returned. It is not stated in the public report whether engine-failure was the reason for the insufficient climb, nor what type of machine and engine were being used.

* * *

HOGG.—Cpl. J. Hogg was killed, and Air Mechanics Johnson and Cox, of the R.F.C., seriously injured, at Folkestone through a motor-car running down a bank.

* * *

LAWRENCE.—Capt. (temp. Lt.-Col., R.F.C.) George Aubrey Kennedy Lawrence, D.S.O., Royal Field Artillery (killed while flying on Jan. 28th), was 25 years of age and the youngest son of Major-Gen. W. A. Lawrence and Mrs. Lawrence, of Pembroke Gardens, Kensington, late of Sandhurst, Berkshire.

Capt. Lawrence passed out of Woolwich into the Royal Artillery in Dec., 1911, and in Sept., 1914, he was attached to the R.F.C. He was gazetted Capt. in the Royal Artillery in August, 1916, and Major in the R.F.C. in the same year.

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He had served with great distinction in the war, and his award of the D.S.O. was gazetted in November, 1915, in the following terms: "For conspicuous and repeated acts of gallantry in France, notably the following: On Sept. 21st, 1915, he completed a reconnaissance to points 60 miles inside the German lines, although repeatedly attacked by a hostile machine. On Sept. 25th he attacked and hit a moving train near Lille, descending to 600 feet. On Sept. 26th he attacked and drove off a hostile aeroplane which was interfering with our bombing machines. On Sept. 30th he carried out a three-hour reconnaissance in very bad weather. Although his machine was hit in 70 places by anti-aircraft guns on crossing the German lines on his way out, he carried on and completed his work."

He was received by the King at Buckingham Palace on Dec. 9th, 1915, and was invested with the Insignia of the Companionship of the Distinguished Service Order.

All who served with him in the Corps held him in the highest esteem, not only as a pilot and fighting man, but as a soldier and an officer. His promotion to command a Wing at such an early age is evidence of the value set upon his ability by his seniors, and his juniors ever had the greatest regard for him personally. The death of so able a professional soldier is a grave loss to the King's Service.

* * *

SHARPE.—At an inquest held on Jan. 30th on the body of Sec. Lt. H. Norman Sharpe, R.F.C., it was stated that while flying at a height of about 500 ft. he made a right-hand turn which was flat and in insufficient bank. The result was that the machine spun and then fell straight to the ground, the officer being killed instantly. The wreckage when examined disclosed no evidence of the controls being jammed or any defects in the machine. Mr. Sharpe was described as a very efficient officer, who had made an error of judgment in turning so flatly. The machine was practically new, and he had flown in it the previous afternoon. A verdict of accidental death was returned.

Engagement.

SOMERSET-LEEKE — HELDER. — The marriage arranged between Capt. A. F. Somerset-Leeke, R.F.C., and Miss Winifred R. Helder, of Lyndhurst, Whitehaven, will take place quietly at St. John's Church, Hensingham, Whitehaven, on Monday, Feb. 19th, at 11.45 a.m.

Marriages.

CLARKE—BAKER.—On Jan. 31st, at Almondsbury, Capt. A. R. Stanley Clarke, M.C., Dorset Regt., attd. R.F.C., only son of Mr. and Mrs. Stanley Clarke, of Berghmote, Wimborne, was married to Marjorie, elder daughter of Mr. and Mrs. Hiatt Baker, of Oaklands, Almondsbury.

* * *

LANCELEY-TAYLOR—RICHARD.—On Jan. 29th, at Paddington, by special licence, Frederick Risdon Lanceley-Taylor, R.F.C., son of the late F. A. Taylor, of Norbiton Lodge, New Malden, was married to Nannette Ernestine Angelique Richard, daughter of Madame Richard, of 27, Craven Hill Gardens, Lancaster Gate, W., and E. Richard, Esq.

* * *

RICHARDSON—LODGE.—On Feb. 3rd, 1917, at the Chapel of the Charterhouse, by the Ven. Archdeacon Tait, assisted by the Rev. the Master of the Charterhouse, Christopher Ridley Richardson., Lieut., East Yorks and R.F.C., second son of William Ridley Richardson, of Bromley, Kent, was married to Winifred Mary, eldest daughter of Alfred Lodge, of Charterhouse, Godalming, Surrey.

* * *

SHARPE—PERSSE.—On Jan. 27th, at Christ Church, Ealing, by the Rev. Templeton King, B.D., Edmund Wilfrid Sharpe, Yeomanry, attd. R.F.C., second son of Mr. Edmund Sharpe and Mrs. Sharpe, of Halton Hall, Lancaster, was married to Eleanor Alice ("Noreen"), eldest daughter of Mr. W. H. Persse and Mrs. Persse, 44, Craven Avenue, Ealing.

Capt. Philip Hunt, Yeomanry, attd. R.F.C., who was previously reported missing, is now reported to be wounded and a prisoner of war in Germany.

* * *

Lieut. Sydney Alder, R.F.C., who has been reported missing, is the elder son of the late Mr. Sydney Alder, and grandson of the late Mr. Gilbert Alder and of Mrs. Alder, of Hargrave, Stansted, Essex. He formerly held a commission in the Sherwood Foresters, and was wounded at the battle of Loos.

* * *

Six members of the R.F.C. were injured as the result of an accident on Jan. 31st, when a heavy motor wagon, in crossing a small bridge near Brooklands, fell over a parapet into the stream below.

FRANCE.

Official Communiqués.

Jan. 30th.—Yesterday three German machines were brought down in air fights by our pilots, including one by Maréchal de logis Hauss, who has up to the present brought down five German machines. It is confirmed that Adjudant Jailler has brought down until now six enemy aircraft—five aeroplanes and one observation balloon.

During the night of Jan. 29th-30th our aeroplanes bombarded bivouacs in the environs of Etain, the military factories of Ham, the stations and factories of Folembray (soutn of Chauny), and the stations of Athies, Hombleux, and Curchy (the three last-named on the Somme front).

Jan. 31st.—According to supplementary reports, it is confirmed that a German machine which was described as having been seriously damaged yesterday was actually brought down north-east of the Bois d'Hallu.

Feb. 1st.—Adjudant Maden brought down yesterday his fifth German machine.

Last night one of our air squadrons bombarded the railway stations and enemy depots of Curchy and Voyennes and the bivouacs east of Nesle.

One of our aeroplanes, armed with a gun, fired about 50 shells on enemy cantonments at Mesnil St. Nicaise and Herly.

Feb. 2nd.—Yesterday a German aeroplane dropped five bombs on Dunkirk. The damage done was insignificant and nobody was hurt.

Feb. 3rd.—Two enemy aeroplanes were brought down in our lines by the fire of our anti-aircraft guns—one near Oulches (Aisne) and the other near Blanc Sablons (Beaurieux region).

Feb. 4th.—Our bombarding aeroplanes dropped numerous bombs on the cantonments and railways at Appilly and Tergnier. One of our squadrons bombarded the munition factories at Thionville.

Feb. 5th.—On the night of Feb. 2nd-3rd and last night our air squadrons bombarded the aerodrome of Colmar (Alsace), the military factories of Rombach (north-west of Metz), and the railway stations of Chauny, Ham, and Appilly (all in the Somme region). A fire was seen to break out among the buildings of the last-mentioned station.

* * *

A special meeting was held on Jan. 30th at the Ministry of Commerce of the Committee appointed by M. Clémentel to study the possibility of making use of an aeronautical service commercially after the war, especially for the national and international postage services. The object of the Committee has been defined summarily by the President, M. d'Aubigny, as follows: "To promote advances in aeronautics, and with this object to contribute in peace towards the development of the aviation industry that originated with the war, and that constitutes a form of national work, and further to exploit the advances made for spreading the influence of the French genius." The special problems that in the view of the Committee demand an early solution are to determine the price of a service per kilometre, the possible utilisation of aeroplanes, the character of the transport service, the practicable routes in France, her Colonies, and Allied countries, the character of the machine that will be most serviceable, and the organisation of stations, relays, etc.

* * *

The French newspapers, in view of German statements to neutrals that in 1916 they only lost 216 aeroplanes, have published a statement showing that from information in the possession of the French aviation service, it appears that the Germans lost 417 machines last year.

They lost two in January, 17 in February, 22 in March, 27 in April, 41 in May, 18 in June, 49 in July, 49 in August, 70 in September, 41 in October, 39 in November, and 42 in December.

It is stated that these machines are definitely known to have been destroyed, and 195 others have been damaged, some of them beyond repair.

Further, 20 sausage balloons were brought down.

* * *

It is reported that fifty German aeroplanes have been brought down by the French Army Aeroplane Squadron No. 55 since its organisation in August, 1915.

GERMANY.

Official Communiqués.

Feb. 2nd.—Front of German Crown Prince.—On the northern sector of the Western front aviators were very active. Our squadrons made valuable observations in the English sector of France. The enemy lost seven aeroplanes in aerial battles.

On Thursday afternoon one of our naval battle aeroplanes—a one-seater—shot down an enemy battle aeroplane—a one-seater—off the Flanders coast.

The enemy machine fell into our hands, and the aviator, a British naval lieutenant, was captured.

Feb. 5th.—On Friday evening several of our Flanders naval aeroplanes lavishly pelted Furnes and Dunkirk with bombs. The aeroplanes returned safely.

* * *

It is reported from Basle that Count Zeppelin is seriously ill at his home at Stuttgart, and is attended by a Berlin specialist. The count has not visited his Friedrichshafen factory for five weeks.

The report adds that the Zeppelin raids on England have been temporarily abandoned, owing to the recent losses and also to the unfavourable weather.

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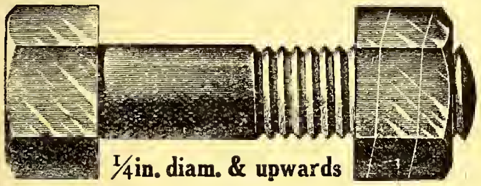

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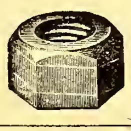

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It was reported from Amsterdam on Jan. 26th that Lt. Bernius, one of Germany's cleverest military aviators, has been killed while testing a new machine near the Western Front. He had been awarded the Iron Cross of two classes, and was considered a second Immelmann.

RUSSIA.

Official Communiqués.

Feb. 1st.—Our aviators dropped bombs on the Bevern Farm (13 and 1-3 miles north-west of Illukst).

One of our aviators was engaged in combat with an enemy aviator.

German aviators have bombarded the region of the village Teplya (13 and 1-3 miles north-east of Postavy) (south-south-east of Dvinsk).

Feb. 4th.—A German aeroplane dropped bombs on Rodenpois station (on the Riga-Petrograd railway) without causing any damage.

Feb. 5th.—A German aeroplane ("a German dirigible," according to Reuter) which was bombarded by our fire, rapidly descended into the enemy's lines north-west of Postavy (south of Dvinsk).

ITALY.

An Italian "daily" says that on Jan. 10th the pilot Angelo Guenzi, stationed at the hydro-aeroplane base at Gesto Calendre, has raised our record for these craft to 18,000 ft. on a F.B.A., built by the Savoia Co., and fitted with an Isotta-Fraschini motor. —T. S. H.

BULGARIA.

Official Communiqués.

Jan. 28th.—In the Vardar Valley aerial activity. On the coast of the Ægean, between the Struma and Kavala, enemy aircraft were very active. A British aeroplane fell north of Kavala, and the aviator was taken prisoner. The machine was undamaged.

Feb. 3rd.—Macedonian Front.—In the Vardar Valley great aerial activity is reported.

* * *

Recent official communiqués report aerial activity between the Struma and Mesta Rivers, and also over Seres.

TURKEY.

Official Communiqués.

Jan. 26th.—After an obstinate aerial combat in the neighbourhood of Kut-el-Amara, Sergt. Jopp, in spite of the enemy's superiority, succeeded on Jan. 11th in bringing down an enemy aviator and in forcing a second to descend to earth. A third was seen to have been hit, but succeeded in escaping. There is nothing to report on the other fronts.

Jan. 27th.—The aviator Meineke engaged six enemy aeroplanes, and forced a biplane to land. We captured the machine.

SOUTH AFRICA.

It is reported from Johannesburg that a call for 100 South Africans for the R.F.C. was met with a ready response at Johannesburg and along the Reef. Capt. Miller had permission to recruit 30, but the number was subsequently increased, as 100 were required. Capt. Miller has already received 800 applications.

INDIA.

Lord Montagu of Beaulieu in a lecture at Delhi on Jan. 26th said that mails and passengers between India and England would, in 10 years' time, be conveyed by air.

The distance to be covered would be from 3,600 to 5,220 miles, according to route, and the time taken would probably be from three to five days.

THE AIRSHIP.

The special "Airship Issue" of The Aeroplane, which was published on Nov. 1st, 1916, was so enthusiastically taken up that it went out of print within a couple of days of its publication. The office of The Aeroplane was inundated with applications for copies which could not be supplied, and the publishers, the William Dawson Publishing Co., Ltd., received many requests for wholesale quantities. It was of course impossible to reprint The Aeroplane as it stood, but it was decided to reprint the special supplement, which contained articles on the construction of the modern Zeppelin, and upon the history, design and construction of the world's airships of every type. Incorporated with this reprint is an article on early airships, and one on kite balloons, together with several additional illustrations.

In all there appear over 50 illustrations, including a double-page drawing of the up-to-date Zeppelin, and detailed drawings of units and parts.

This reprint, which is printed on art paper, is quite unique, and forms an extremely useful record for reference on the subject of airships. Copies may be obtained from any newsagent, price 6d., or from the William Dawson Publishing Co., Ltd., for 7d. post free. As this production is strictly limited in number, applications should be made without delay.

MR. PEMBERTON-BILLING v. THE "GLOBE."

Those who believed that Mr. Pemberton-Billing, M.P., was an extinct volcano were probably rather surprised at the amount of attention given by the Press last week to his libel action against the "Globe" newspaper. One does not turn out a whole fire-brigade to attend to a fire which has already burnt itself out. Judging by the attacks in the Coalition Press and by the careful editing of the reports of the action, in which reports everything which appeared to be to the discredit of the plaintiff was given prominence, and the consequent deletion—doubtless owing to scarcity of paper—of any points in his favour, one receives the impression that the Coalition called out the whole of its extinguishing apparatus, steam, gas, chemical, and mud-slinging engines in the hopes of suppressing the insuppressible.

One gathers that application was made on behalf of the plaintiff to have the case heard at an earlier date, but it may not have been a piece of political manœuvre which procured the hearing on the eve of the opening of Parliament. At the same time, it is well to remember that the Coalition, which it is important to remember is not Mr. Lloyd George and his Cabinet, but a cabal of politicians at present mostly out of office, is composed largely of lawyers who have no reason to love the Member for East Herts.

As it turned out, the plaintiff had to fight not a libel action against a newspaper, but a virulent attack on his personal and political character. One has always understood that in a case tried before a jury, the judge is supposed to confine his activities to directing and advising the jury on points of law. Mr. Justice Darling is a most able lawyer, and no one would presume to differ from him on legal points, but, on this occasion, if his summing-up and his remarks during the case have been correctly reported, he appears to have been carried away by his feelings.

As for Mr. Rigby Swift, one might have imagined that he was leading counsel for the prosecution in a non-existent case of The Coalition v. Pemberton-Billing.

The case, it will be remembered, turned on a "Globe" poster, which read, "Spying for Pemberton-Billing," "Airman arrested." The words, "Spying for Pemberton-Billing," had occurred in the Admiralty indictment of one Middleton, an ex-probationer for a commission in the R.N.A.S., who had written articles for the Press under the pseudonym of "An Air Pilot,"—a pure assumption, in fact, in that he had never taken a pilot's certificate, either on airship or aeroplane.

The official indictment alleged that this youth went to Dover and endeavoured to extract some information from officers of his acquaintance, stating that he was "doing a bit of spying for Pemberton-Billing." His subsequent career is immaterial, but it is somewhat important to note that he was not then, or before or after, working for, or in alliance with, the Member for East Herts.

Nor does it matter much whether, in fact, he was spying within the meaning of the Act, when he was said to have accused himself of doing so. The point for the jury to decide was whether a quotation from the official indictment of this Middleton constituted a libel on Mr. Pemberton-Billing.

Writing as a person who met one of the offending posters suddenly, and without warning of the Middleton affair, one must confess that the words, "Airman Arrested," seemed to imply that the line above was the charge on which he was arrested; and one's first sensation was a shock, and a mental question as to whether the leader of the agitation for adequate aerial defence had made the mistake of overstepping in his enthusiasm the bounds of the Defence of the Realm Act. One's next sensation was a kind of attempt to size up how much damage would be done to his reputation by the suggestion conveyed in the poster, and how much consequent damage would be done to the cause for which he was fighting in common with such well-known men as Lord Montagu, Mr. Joynson-Hicks, Captain Bennett-Goldney, and others.

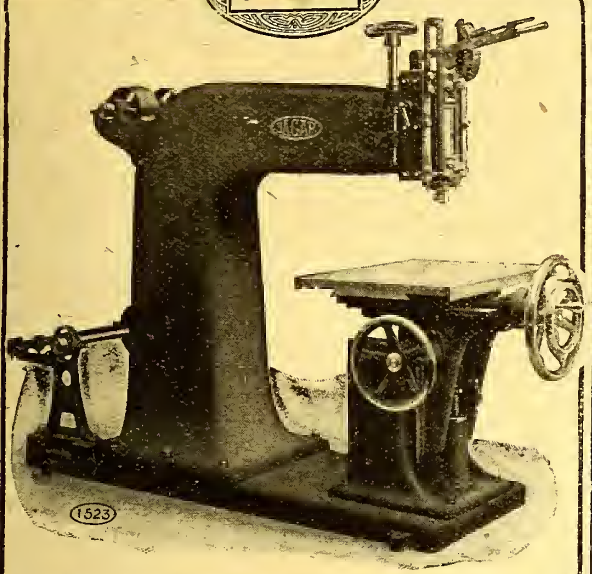
One does not suggest that the "Globe" desired to damage him, or the said cause, for the "Globe" itself had done good service in the general campaign against the Asquith régime. But the juxtaposition of words in the poster certainly conveyed an idea which, to the present writer, at any rate, seemed likely to harm the cause of the air-reform agitators in general, and the Member for East Herts in particular.

The Jury's Verdict.

One obtains the idea from the Press reports that the jury came to an agreement at once. As a matter of fact, they consulted in private for some considerable time, and seemed unlikely to agree. Finally, they gave the noteworthy verdict that the words were not a libel.

That, kindly remember, is a very different thing from saying that the libel was justified, and still more different from saying that they were a libel, and awarding contemptuous damages of a farthing or so, which would have permitted Mr. Billing's enemies thereafter to fling at him the jibe that a jury had valued his reputation at a farthing.

SAGAR



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On this point the "Daily Chronicle" seems to have made rather a curious slip in its leader for Feb. 2nd, for it says:—" The 'Globe' had said that he employed a journalist who was formerly on the staff of the 'Daily Mail' to 'spy' for him at Dover—to obtain information on aviation matters for his use in the House of Commons—and the jury found that the statements in the paper were true but not libellous."

If this means anything it conveys the impression that the jury found that it was true that the Middleton had been spying for Mr. Pemberton-Billing, which the jury did not find. As a matter of fact, they were not even asked to find whether such was the case, as it had been settled in Middleton's trial months before that he was not acting in collusion with Mr. Pemberton-Billing.

What the jury actually found was that there was no libel in quoting on a poster a single phrase from an official indictment, which is quite a different story, and the "Chronicle" would do well, in the interests of journalistic honour—assuming the existence of such a quality—to make this point clear in a future issue.

The Chief Point for the Prosecution.

The chief point laboured by the Coalition prosecution was the matter of the letter from Sir John Boraston to Mr. Balfour, in which it was stated that Mr. Pemberton-Billing "must be discredited" if he was to be prevented from capturing the seat for East Herts. Every effort was made to persuade the jury that the disclosure of this letter to Mr. Billing was due to spying of a nature if anything, more criminal than that with which Middleton was charged.

> The letter in question reads as follows:—"I am sorry to trouble you so much about Billing. He has undoubtedly captured the imagination of the public. The seat is in danger, and unless we can discredit him, I fear that he will be returned for East Herts."

The prosecution appears to have omitted to notice the difference between spying on the King's Services as such, and tapping a singularly dirty private line in the best interests of clean politics and the welfare of the Flying Services. Apparently, despite the persuasive eloquence brought to bear on them, a jury of plain English business men was able to discover the difference for themselves.

The best generals make strategic and tactical errors at times, and, perhaps, Mr. Pemberton-Billing played his cards badly in defending his friend against the risk of discovery. He has ever been more of a strategist than a tactician. His strategy in planning his campaign to enter the House of Commons and fight for adequate aerial forces was excellent, but he committed tactical errors in making certain personal attacks inside the House. A kind of political Prince Rupert, he let his own impetuosity and the momentum and sincerity of his attack run away with him.

Similarly, his loyalty to his friend so absorbed his attention in defence that it was possible for eminent lawyers to get under his guard, and, to use the slang phrase, tie him in knots, on that one point. Curiously enough, or, perhaps, after all, not very curiously, if one takes into consideration the average Englishman's love of fair play, one finds in conversation with the "man in the street" that Mr. Billing's readiness to withdraw his evidence regarding the existence of the Boraston letter, and so to expose himself to the fierce attacks of Mr. Justice Darling and Mr. Rigby Swift, in the effort to prevent them from extracting any statement which might indicate the source from which he obtained the copy of the letter, has rather raised Mr. Billing in the estimation of the said "man in the street."

The spirit which produces such a curious state of sympathy is indicated in Mr. Kipling's lines:—

> "If there be trouble to Herward, and a lie of the blackest can clear,
> "Lie while thy lips have breath, and a man is alive to hear. '

A man friend's reputation is as dear to a loyal friend as is the reputation of any "Her," hence, perhaps, the evasiveness of Mr. Billing's answers to the questions about the letter. Even the best shorthand reports are so liable to error that it would be difficult to discover the precise wording of Mr. Billing's first answer, which, apparently, gave Mr. Justice Darling the impression that Mr. Billing had the letter, or a photograph, or a copy of it in his pocket, or somewhere in his possession, or in his friend's possession, or on a file at the Admiralty or somewhere.

It is not quite certain that Mr. Billing did not score in another and unintended way, because no one can now be quite sure whether a photograph, or a lot of photographs, of the Boraston letter still exists, or where, so that it might be rather a dangerous game for the Coalition to deny its existence, if they want to try to "discredit" Mr. Billing any further.

An Improper Introduction.

Incidentally, no one seems to have thought it worth while to inquire how it came about that a letter of such a description came to be mixed up with Admiralty documents at all. Admiralty correspondence is presumably concerned with the carrying on of the war, and not with party politics, so that the letter, which may or may not have been improperly abstracted from the Admiralty, was certainly improperly introduced into that department.

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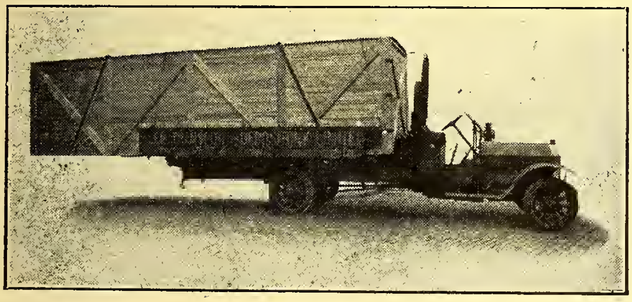

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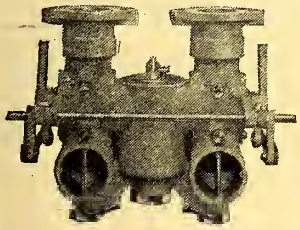

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Further, if—as is by no means certain—it was abstracted, or copied, or photographed, or disclosed by an officer at the Admiralty, that officer would not appear to be liable to any penalty under the Defence of the Realm Act, or whatever Act controls the secrecy of Naval affairs, for the Boraston letter had nothing to do with the Navy.

Moreover, unless one misreads its intention, there exists another Act, expressly passed for the protection of Parliamentary candidates, which makes it a libellous offence to drag up the past life of a candidate with a view to discrediting him in the eyes of his constituents. The writer of the letter, being the chief agent of a political party, might have known as much.

It would appear that the Boraston letter was an attempt to invite Mr. Balfour to commit an offence under that Act, in which case the officer—if any—who abstracted or copied the letter—if it existed, was actually doing a praiseworthy act by removing temptation from the path of Mr. Balfour, who has confessed himself a child in some matters, and has proved himself a child in others.

The New Situation.

Mr. Pemberton-Billing acted as a sportsman and a gentleman in offering to resign his seat and seek re-election. An ordinary politician would have sold himself and his vote to a Party or a Profiteer in order to retain his seat. If he is asked to remain by East Herts he will have strengthened his position enormously, and will have thoroughly vindicated his character against all the slanders levelled against him.

If he is rejected through the intrigues of the Coalition, he will be no worse off than when he was defeated at Mile End,—except that he will have spent many thousands of pounds and a strenuous year's work in fighting at home the battles of the Flying Services, which had to be fought if those Services were to fight their battles abroad under the best conditions of organisation and equipment.

The action of the Coalition, and especially the manner in which they will seek to discredit him, in the coming campaign, will be watched with interest by those who know how much the Flying Services have benefited by the agitations raised by Mr. Pemberton-Billing last year.—C. G. G.

THE LONDON AERODROME.

Readers of The Aeroplane should note that the London Aerodrome at Hendon, the proprietors of which are the Grahame-White Aviation Co., Ltd., has been taken over by the Government under the Defence of the Realm Act, together with a number of the sheds. For this reason it will be impossible to admit the public in future, and the giving of passenger flights will naturally also have to cease.

It is with a feeling of regret that this announcement is made, because undoubtedly the London Aerodrome has done a great deal to educate the people of this country as to the possibilities of aircraft for military purposes. It is, of course, impossible to say how long the aerodrome will be under Government direction, but those of its habitués who survive the war will look forward to a return in the days of peace; though there is always the possibility that the aerodrome may become a permanent institution.

EXTRA WORK.

Aircraft firms in West London who want any assistance in the drawing office would do well to communicate with the writer. A friend of his, at present employed on aircraft work, finds that he has some hours on his hands in the evening which he would be glad to devote to extra work, either drawing or tracing. He has had four years' experience of aeroplane design and construction, and as his present work is of a different nature no injustice would be done to his firm by his doing drawing office work, which he would prefer to do at home. Any inquiries should be addressed to "X," care of The Aeroplane, 166, Piccadilly, W.

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ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of The Aeroplane. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

Readers by the Hundred.—If you want any information about joining the R.F.C., write to the Director of Military Aeronautics, Adastral House, Blackfriars, E.C.

If you want any information about joining the R.N.A.S., write to the Air Department, The Admiralty, Whitehall, S.W.

Men in the Army, and ratings in the Navy can only obtain commissions in their own branches or transfers to other branches by permission of their immediate commanding officers, who must forward those applications through the proper official channels.

Civilian applicants for commissions in the R.F.C enter through the Cadet Wings, and are trained to fly at the Government's expense.

Applicants for commissions in the R.N.A.S. enter as Probationary Flight Officers, and are trained at the Government's expense.

If you are blind or partially blind, or have to wear glasses for any reason, you cannot become a Naval or Military aviator.

If you have had special technical training, are over 35 years of age, and attain the necessary social standard, which is not high, you may with luck become a Stores Officer R.N.A.S., or an Equipment Officer R.F.C., even if your sight is defective and you are physically deficient in other respects.

Information concerning appointments as viewers or examiners and inspectors in the Aeronautical Inspections Department may be obtained from the Chief Inspector, A.I.D., Adastral House, Blackfriars, E.C.

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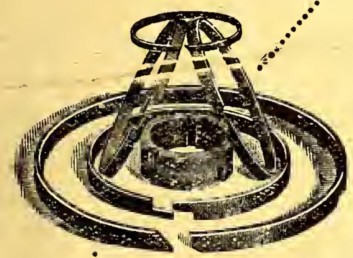

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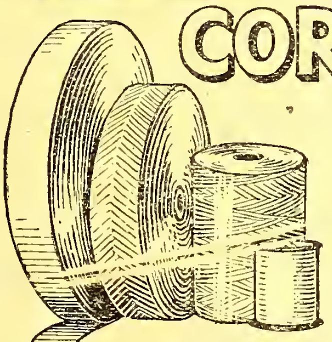

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deal of unnecessary correspondence at the Admiralty, at Adastral House, and at this office. as there is no need to write letters on any point already explained above. The Editor is always pleased to answer questions or explain any points not understood by readers, but space in The Aeroplane is valuable, and the same question cannot be answered over and over again week after week. Consequently readers are requested, when asking questions, to make quite sure that the same questions have not been answered a week or so before.

A. (Erdington).—It is almost, if not quite, impossible for an enlisted man to transfer from one unit to another. If you wish to get into the R.F.C., your best plan is to ask your C.O.'s permission to apply for an appointment to the R.F.C. Cadet Corps. Applications should be addressed through your C.O. to the Department of Military Aeronautics, Adastral House, Victoria Embankment.

T. L. E. M. (Mapperley Park).—The idea of collapsible chassis which can be stowed inside the fuselage of an aeroplane is almost as old as flying itself, and various attempts were made to carry it out in the early days. The chief drawback to anything of the kind is the extra weight and complication of such a chassis, and there is very little room in the average aeroplane fuselage in which to store a pair of large wheels and tyres and a number of struts. As a matter of fact, the modern streamlined aeroplane chassis does not offer an excessive amount of head resistance, and a great drawback to the disappearing chassis on small machines in particular would be that it would absolutely upset the balance of the fin area of the machine.

You are correct in your suggestion that the Martinsyde monoplane designed for an attempt on crossing the Atlantic was intended to be fitted with a chassis which could be dropped as soon as the machine started on its flight.

The best way to obtain a commission in the R.N.A.S. is to apply for an appointment as a Probationary Flight Officer, R.N. If you pass through a Naval college, you will be expected to go to sea.

G. W. F. (Yorkshire).—The chances are that the piece of propeller you have found is off a British aeroplane Probably if you saw the whole of the transfer it would clear up the mystery. If opportunity offers we will examine the transfer on a Zeppelin propeller and give the full inscription in The Aeroplane.

The modern Zeppelin is trimmed by the employment of water ballast, but this relates chiefly to regulating its buoyancy, although, of course, if it is decided to carry an exceptionally heavy load in the front car this can be compensated for by emptying the forward ballast bags and filling the aft. On a long object like a Zeppelin. 50 or 60 lbs. weight placed at one end would make quite an appreciable difference in the trim of the vessel.

I. K. (Mayfair).—There is no practical aeronautical engineering school at present existing in London. I should recommend you to apply to the Regent Street Polytechnic with a view to undergoing a course of practical general engineering training.

B. G. M. (Downton).—It is just a little bit doubtful whether a man passed as C.3 would be accepted as an equipment officer, as he would probably be required to go abroad. As, however, the authorities are often willing to allow a "home service" man to volunteer for foreign service, this might be no disqualification, provided nothing very serious is the matter with you. The principle qualification for the post of equipment officer is a certain amount of technical experience. Your previous experience on Government contracts and as draughtsman would probably qualify you, and motor experience is always useful. Application should be made to the Directorate of Military Aeronautics, Adastral House, Victoria Embankment, E.C.

G. L. F. (Hythe).—It is quite impossible to say in these days whether the rotary engine is better or worse than the stationary engine. Each engine is used for its own purpose, and does it well or badly according to its individual design. Until a stationary engine can be made to give about 1 h.p. for 2 lbs. weight, including cooling system and everything else, the rotary engine will remain popular for light, fast machines.

S. G. (R.N.R.)—Man-lifting kites were scrapped in favour of the kite-balloons long ago, as the man-lifting kite was far inferior from every point of view to the kite-balloon. The nerve strain on the observer was ten times as bad. and the kite was nothing like so stable. It was useless unless a strong wind was blowing, and could not be used if the wind was too strong, as no cable could be used that would hold it.

It is quite impossible to discuss the extent to which the kite-balloons are used in connection with mine-sweeping operations. Many experienced people will agree with you on the subject of the peculiar defects of American motor boats, and there will probably be a first-class scandal about them after the war.

E. K. R. (Naval and Military Club).—I believe there is a school of instruction for Morse and wireless at Marconi House, Aldwych, W.C. If they cannot help you, they will doubtless be able to put you in touch with the right people.

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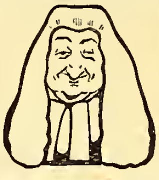

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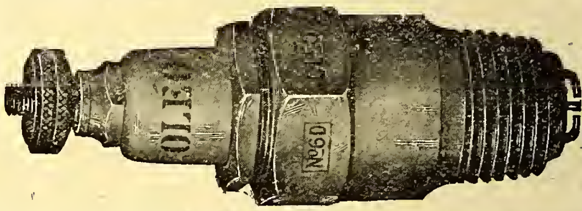

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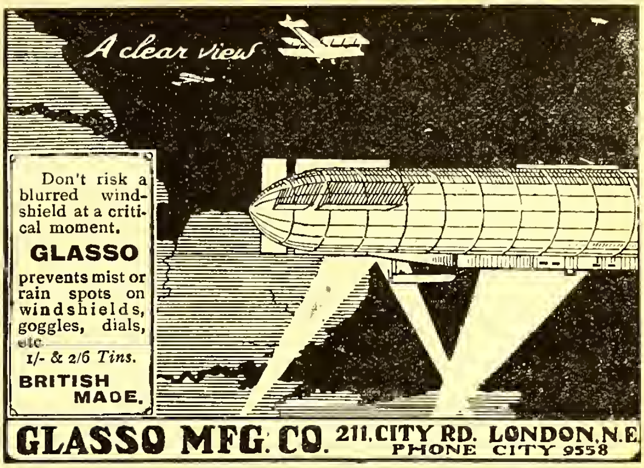

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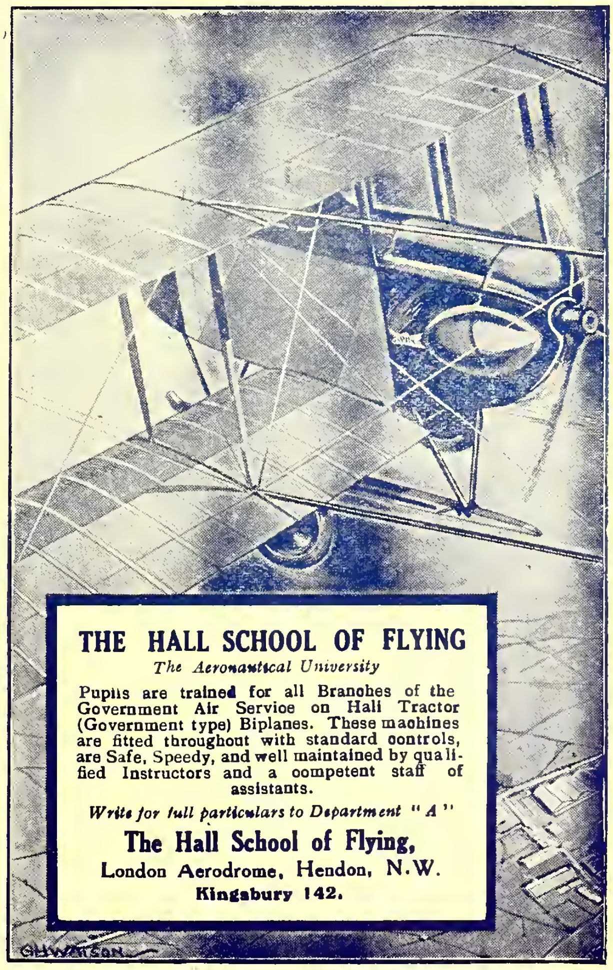

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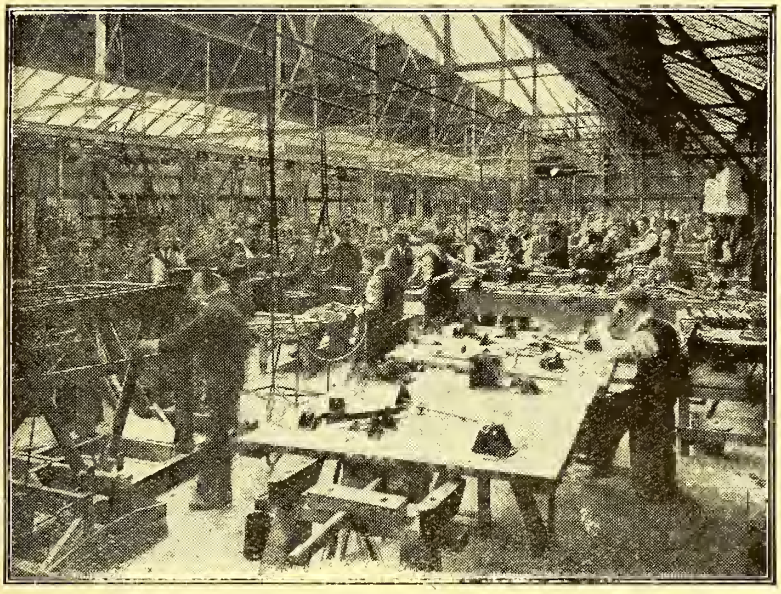

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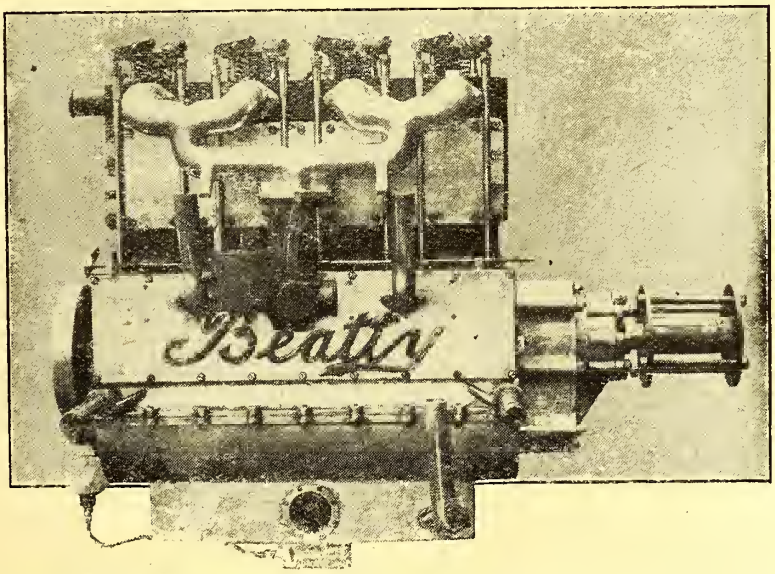

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ON THE PASSING OF THE COMMODORE.

Though as I write no announcement of Commodore Sueter's new appointment abroad has been gazetted, it is known to all concerned with the Royal Naval Air Service that he is not long to occupy the post of Superintendent of Aircraft Construction, to which he was appointed late in 1915 on the abolition of the office of Director of the Air Department which he had previously held. Therefore it seems apposite to give a brief account of the work he has done as the founder, and father, of the Royal Naval Air Service.

Commodore Murray F. Sueter, C.B., was already a Post-Captain R.N. when flying first began. He was one of the first officers in Her Majesty's Service to devote his attention to the submarine ship of war, and the Submarine Service, to-day perhaps the most efficient branch of the King's Navy, owes much to his foresight and to his ability to envisage the future possibilities of under-sea warfare. As a submarine officer Captain Sueter did distinguished service, and his book on this type of vessel, though written something over ten years ago, was at the outbreak of war the standard work on the subject.

His Early Attention to Flying.

When the ability of man to fly first became apparent, Captain Sueter at once comprehended the possibilities of the new weapon with the same facility as he had foreseen the future of the submarine, and proceeded to inform himself in such knowledge of aeronautics as then existed.

The Zeppelin airship was then in its infancy, but its performances already indicated its potential value.

The Wright Brothers were just demonstrating to Europe the truth of the almost unbelievable tales which had come to us across the Atlantic about their astonishing achievements. Captain Sueter saw what those achievements portended.

When the first great Aviation Meeting was held at Reims, in July of 1909, Captain Sueter was one of the little group of British officers present in a semi-official capacity to observe and report upon the latest developments. So much was he then impressed that thenceforward he devoted himself entirely to the aeronautical branch of the King's Service.

A Fearsome Speculation.

After much careful consideration it was decided by Their Lordships of the Admiralty that the Navy should speculate in an airship. Captain Sueter was the senior officer concerned with its construction, and he, with the officers appointed for the purpose, wisely decided that a ship of the Zeppelin species would be the best type with which to experiment. The result was the late lamented "Mayfly," a structure which, though unsuccessful as an airship, nevertheless embodied many excellent ideas, and was the indirect cause of producing many others, such as the floating wind-screen and the nose-cap system of anchorage.

The final mishap to the "Mayfly" was not the fault of any of the Naval officers concerned, and, in any case, she now appears—in the light of our later knowledge—to have been by no means a bad effort for a first attempt. If Their Lordships of the period had possessed sufficient intellect to appreciate the possibilities of airships, they would have sanctioned a continuance of the experiments, and we should undoubtedly by now have possessed ships at least as good as modern Zeppelins, with proper means of handling them at sea. And if we now possessed such ships, the present submarine blockade would be very much less of a menace to the welfare of the country than it is at the moment.

The Coming of the Service Aeroplane.

Seeing that there was no possibility of obtaining the money necessary for an adequate airship programme, and realising, also, the potentialities of the aeroplane, Captain Sueter followed the line of least resistance and resolved to develop an aeroplane branch of the Navy.

At that time the Army Council, itself slow enough to see the uses of aircraft, and hampered still further by a Master-General of the Ordnance who openly disbelieved in the military, or any other, utility of aeroplanes, was, nevertheless, not quite so impervious to modern ideas as was the Board of Admiralty. The Royal Flying Corps was formed, under the particular care of Brigadier-General David Henderson, D.S.O., Director of Military Training.

It was decided that the Royal Flying Corps should consist of a Naval and a Military Wing, either Service being supposed to borrow aviators from the other as and when required. None in high authority seemed to comprehend the simple fact that a sailor is a sailor and a soldier is a soldier, on earth, on sea, and in air, and that the training of aviators for the two Services is entirely different.

The First Naval Pilots.

By the grace of Their Lordships of the Admiralty, three Naval officers and an officer of that distinguished regiment the Royal Marine Light Infantry were permitted to draw full pay while they were taught to fly by a gentleman-amateur aviator, on machines lent by another gentleman, at an aerodrome lent by the Royal Aero Club. Thus that child of charity, the Naval Wing of the Royal Flying Corps, came into being.

In the military manœuvres of 1912 and 1913, a few Naval pilots on shore-going aeroplanes assisted, and did good service, but there is no record of Military pilots assisting in Naval manœuvres.

THE SAVING OF THE BRITISH AIRCRAFT INDUSTRY.

As early as 1912 the Naval Wing, R.F.C., began to write of itself in official papers as the Naval Air Service, and it was fairly obvious that an amphibian Flying Corps was an absurdity, though the two Flying Services should obviously keep in close touch, for the interchange of the technical knowledge gained by experience.

It was evident that Captain Sueter appreciated the need for a big Naval Air Service, and those of us who were intimately in touch with the Services and with the Aircraft Industry realise to the full how much this country owes to his foresight. At a time when the policy of the Military Wing was apparently the complete suppression of private enterprise in aeroplane design, and absolute reliance on the official designers at the Royal Aircraft Factory—whose machines were consistently months behind those of the starving Aircraft Industry in performance—the Naval Wing did its best with the limited means placed at its disposal by their obtuse Lordships to keep alive a spirit of enterprise and progress among private makers and designers.

While the Army was ordering duplicates of officially designed aeroplanes from favoured firms which had failed to produce satisfactory aeroplanes of their own, or was ordering French aeroplanes direct, the Navy was encouraging the production of new and better aeroplanes by the "Trade." Short Bros., the Bristol Co., the Sopwith Co., the Caudron Co., A. V. Roe & Co., J. S. White & Co., the Norman Thompson Co., were among the firms who depended on the Navy for their existeuce, or for the adoption of their new machines, and all produced, thanks to that support, machines which have assisted materially in the development of the British aeroplanes of to-day—aeroplanes which are, so far as the latest types are concerned, indisputably the best in the world.

THE EARLY STAFF.

Captain Sueter had gathered round him in the Air Department at the Admiralty a little group of exceedingly able young officers, and at the Naval Air Station at Eastchurch, then a very small affair, he had under his control some of the most brilliant pilots the world has seen. These young officers, some of them preternaturally wise for their years, were quick to appreciate the superiority of the independently built aeroplane, produced in free competition with other firms, over the stereotyped official designs produced by favoured individuals without the spur of competition.

Doubtless many of these officers had learned by experience of Naval dockyards the deadliness of official methods. Hence the institution of the policy of encouraging the "Trade" to give the Service of its best, and the "Trade" responded loyally. The result was that when war broke out both Services had at their disposal a number of aircraft factories which, but for this policy of the Navy, would have gone out of existence through lack of business, or would have been humbly making inferior official aeroplanes in penny numbers.

THE BEGINNING OF THE ROYAL NAVAL AIR SERVICE.

With the adoption of these diametrically opposed policies, the Naval and Military Wings of the Royal Flying Corps drifted farther and farther apart, and the natural development of the differences between the aerial duties of the two Services accentuated the division. As the result, the Royal Naval Air Service came into existence as a separate entity, by Royal Warrant, on July 1, 1914, and it made its first public appearance as such at the mobilisation of the Fleet at Spithead some three weeks later, when the so-called Naval Review was arranged as a warning to Germany.

MR. CHURCHILL'S HIGH SERVICE.

In his energetic efforts to produce a big and effective Naval Air Service, Captain Sueter, who became a Commodore on the formation of the R.N.A.S., was enthusiastically backed up by Mr. Winston Churchill, then First Lord of the Admiralty. Mr. Churchill himself flew on all types of seaplanes and land machines, at first as passenger and later as pilot, and acquired a vast amount of first-hand knowledge of aircraft.

But for him, even Captain Sueter's earnestness and energy could not have produced such good results from a singularly apathetic and obtuse Board of Admiralty, and, even with Mr. Churchill's assistance, progress was seriously delayed by the necessity for continually trying to prove the obvious to the uninterested.

It must therefore never be forgotten by those who are concerned with the past, present, or future of the R.N.A.S. that, if it owes its initiation and its very existence to Commodore Sueter, it owes its rapid progress during the year immediately preceding the war to Mr. Churchill's appreciation of the future value of aircraft and to his personal enthusiasm for flying.

In this matter alone Mr. Churchill has done a high service to the Empire, which more than justifies his political existence, and one appreciates his service the more when one contrasts it with the apathy or incompetence of his successor.

DIFFICULTIES OF PERSONNEL.

From its inception the Naval Air Service has suffered owing to the nature of its personnel. The aviator is by nature something of a law unto himself, and even those who, without being aviators, took a keen personal interest in flying in its early days betrayed by their doing so a touch of madness,—that is to say, when judged by the standard of the stolidly sane Englishman who is content to hold his job down with the minimum of effort, to do his duty in that state of life to which it has pleased God to call him, and to refrain from the bad form of making himself conspicuous by any display of originality.

All we who assisted at the birth and upbringing of aviation are mad, though there may be method in our madness in some cases. In other cases, especially among the "star turn" pilots, there has been, and still is, considerably more madness than method. Thus it needs no vast intellect to understand that discipline among the personnel was and is one of the great difficulties of the R.N.A.S.

THE PIRATES.

The ordinary seafaring Naval officer is by nature a bit of a pirate, if descended from a proper Naval family, and piracy is more or less part of his education. That is chiefly why the Navy is as successful as it is, and it also accounts for the difference between Naval and Military methods of discipline. I am not libelling the Navy. If you refuse to believe me, ask any dockyard official about the methods adopted by any officer of any ship when refitting from the dockyard.

Now, when the madness of the aviator is blended with the nature of the ordinary sea-robber, the result is apt to present difficulties to those set in authority over it. And here has always been one of the greatest weaknesses of the R.N.A.S. when considered as an organised fighting force, and not as a crowd of extraordinarily gallant and reckless young men.

The first Naval officers to come under Captain Sueter's command were almost all too young and too adventurous to make good disciplinarians. The officers of the Royal Marines who have joined the R.N.A.S. have all been

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excellent soldiers, and most of them are fine disciplinarians, but it was inconceivable that any Marine could hold high command in the Naval Service.

Senior Naval officers, as a rule, took no interest in aviation until quite recently, and the few who did, and who might have imparted a proper spirit of discipline to the units of the R.N.A.S., could not be spared from the Fleet, which was always short of officers. Those who could be spared—well, all that one can say about them is that they could be spared.

The result was obvious, and became evident to the public at large not long after the beginning of the war, when letters used to appear in the papers about the conduct in public of the young officers of the R.N.A.S.

Where the Blame Lay.

No blame could attach to the Director of the Air Department, Commodore Sueter, for such a state of affairs, for he could not obtain the officers he knew to be needed. The blame must be laid at the door of the Board of Admiralty as it then existed, which was mentally incapable of realising the great importance of a real Naval Air Service.

It took more than two years of war for the Government to understand that what needed reform was not the Navy as such, nor the R.N.A.S. as such, but the Lords of the Admiralty themselves, and that reform had to begin at the top and work downwards. We have now a new Board of Admiralty, hardly as yet settled into its stride, so that it still remains to be seen whether all the evil influences at work in the life of the R.N.A.S. can be abolished. At any rate, good beginnings have been made, and the appointment of Commodore Godfrey Paine, C.B., M.V.O., as the first Air Lord of the Admiralty augurs well for the future discipline of the R.N.A.S., provided always that he can obtain officers of the right type to carry out his plans, and is not compelled to operate solely through senior officers who have been washed ashore from the Fleet.

The Technical Disasters.

Commodore Sueter's difficulties were largely increased by the fact that, immediately on the outbreak of war, nearly all his best officers rushed away on active service, taking with them their hard-earned knowledge of aircraft. At the same time the technical staff at the Admiralty had to be increased in order to handle the demand for more and more aeroplanes with which to equip the rapidly growing numbers of pilots.

The result was absolutely disastrous. Man-power and material were wasted at a rate which would stagger the imagination if expressed in figures. Young men who would have considered a five-pound note to be wealth before the war were let loose to handle money in thousands of pounds at a time.

Figure-juggling theorists found themselves in a position to put their inaccurately calculated theories into practice. Absurd machines were built at vast expense. Perfectly good aeroplanes were altered to agree with unproved ideas, and ruined as flying machines in the process. Types which were useless were ordered in quantities. Types which could do good service were not ordered at all.

Engines known to be useful were refused. Engines which might have been useful if left to their own designers were spoiled, or delayed in development, by interference from young gentlemen of academic distinction, but remarkably ignorant of the principles of internal combustion engines.

Chaos.

The inspection staff seems to have been selected utterly at haphazard. Men of some mechanical experience, perhaps, but entirely ignorant of aircraft work, were sent to inspect the productions of men who already knew more about aeroplane construction than any official at the Admiralty was ever likely to learn. Men whose past records would ill bear investigation were put into responsible positions far from the control of headquarters, and brought contempt on the Service.

Men of the counter-jumper class were made commissioned officers R.N.V.R. and sent to control and supervise, by virtue of their uniform, the work of manufacturers to whom they would have begged for a job at thirty shillings a week before the war. A few really good, sound engineers and men with aircraft experience managed to fall into this general muddle by accident, and so some few good results were achieved, but the general effect was a perfect chaos of muddle, intrigue, incapacity, back-biting, and, it is alleged, graft, though on this latter point I cannot write from reliable knowledge.

The Inefficient Subordinates.

Again the blame cannot be placed on the Director of the Air Department. For the director of such a department there can be no to-day. His to-day must be six months ahead, and he must be laying his plans for the Service as it is hoped it will be on that date. The execution of his plans of six months before, as they are being carried out to-day, must depend on his subordinates.

If those subordinates spend their time lunching and dining at flashy restaurants and dashing about in flashy cars, while their chief is content with quick meals at a quiet Service club and many laborious hours in his office, the work of to-day suffers, and the chief will probably not discover that anything is wrong for many months, for it is so easy for the subordinates in a new thing like the Air Service to be " out on a job of work " if the chief happens to want them in his room while they are doing themselves well in the vicinity.

The Difficulties of Reform.

If active-service pilots complain that their machines are not what they need, or that they are short of machines, their complaints may have to pass through the hands of senior officers who do not in the least understand them, and so into the hands of the very subordinates who have made a mess of the department. Which subordinates may merely "lose" the complaints conveniently, or work up some specious excuse backed by a mass of figures, probably inaccurate, and proceed to demonstrate to their chief that their latest machine, now in process of construction, will render everything else obsolete, so that there is no sense in ordering obsolete types.

If after a long period an active-service pilot manages to get home on leave, and succeeds in short-circuiting his complaints verbally to the chief, contrary to all regulations, he may convince him that something is wrong, and some slight improvement may be secured. But that pilot is a marked man thereafter, and the inefficient subordinates may plan for his removal, or his disgrace, the moment opportunity offers.

And they are so busy intriguing to hide their own crimes and to discredit those who have discovered them that the production of aircraft and the administration of the Service suffer accordingly. Something not very unlike that state of affairs accounts for much evil in the R.N.A.S.

Hindrances Above.

If, again, the chief of department is finally convinced by continual complaints from active-service pilots that

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a sweeping reform is necessary, and that all his inefficient subordinates must be cleared out, he is likely to meet with hindrances from above, and to become at the same time the object of intrigues on the part of his subordinates, who pull strings communicating directly or indirectly with those above, to prevent their own removal.

A public scandal must be avoided at all costs, and a clean sweep of the underlings of a department would be a public scandal. Better, then, a "reconstruction." Which, also, is not unlike what has happened twice already at the Admiralty.

THE AGITATION PERIOD.

The agitations in and out of Parliament in the winter of 1915-1916 caused some considerable stir in the R.N.A.S., though the results were most felt in the R.F.C. The needed reforms in the R.N.A.S. were side-tracked, but not met, by appointing Admiral Vaughan-Lee to be Director of Air Services, and by promoting Commodore Sueter to be Commodore 1st Class, and making him Superintendent of Aircraft Construction.

Admiral Vaughan-Lee did his best in face of the fact that he knew nothing about aircraft, apparently cared as much, and was too old in the Service to learn any more. After a year of the job he was beginning to know something about it, when he was removed by the second reconstruction and the appointment of an Air Lord.

In the interim nothing has happened. The published lists of appointments to the R.N.A.S. show that it has grown very little in size. The enemy probably know better than anyone else whether the R.N.A.S. machines are much, if any, better than they were a year ago.

THE WAYS OF OUR FATHERS.

The other day a couple of friends of mine were discussing the methods of British manufacturers. One of them was aggrieved at a piece of colossal stupidity over a job he had had done, and wound up his tirade by saying, "I suppose the fool did it in that way because his father did it that way and his father's father did it that way. 'Pon my soul! I believe we shall win this blasted war simply and solely because our damned old fathers got into the habit of winning wars, and we can't understand how to do anything else."

Setting aside the naughtiness of his language, he seems to have some reason in his remark. But some of our fathers' ways do not deserve repetition.

Nothing so much resembles the past history of the R.N.A.S. as the Navy of Charles II, as described in Mr. Samuel Pepys his diary. All the intrigues against and between my Lord Sandwich and His Grace the Duke of York, and Mr. Carteret and the rest, and the mess and muddle and inefficiency blamed on my Lord Sandwich, for which he was not responsible, seem very like today's methods.

Moreover, on the second day of October, 1665, Mr. Pepys—as Comptroller of Naval Supplies at the Admiralty—did write in his diary:—

> "We got by morning to Gillingham, and thence all walked to Chatham; and there with Commissioner Pett, viewed the Yard; and among other things, a team of four horses come close by us, he being with me, drawing a piece of timber, that I am confident one man could easily have carried on his back. I made the horses be taken away, and a man or two to take the timber away with their hands."

Which, after all, is remarkably like the R.N.A.S. idea of efficiency to-day, especially at the R.N.A.S. Dockyard, yclept the White City, and only shows how mighty little Naval economy has altered in two hundred and fifty years.

A MAN'S JOB.

All these things afford a full-time job for a strong man if they are to be cleared up, and I hope to heaven Commodore Godfrey Paine will do it!

Commodore Paine is the one senior Naval officer besides Commodore Sueter whose knowledge of aeronautics has grown with the growth of the Flying Services. For years he has worked more for the Army than for the Navy, as Commandant of the Central Flying School, and in that pleasant capacity he has learned more about the practice of flying—and, one hopes, less about the theory—than any officer of his seniority in either service, and, indeed, more than any except a few above the substantive rank of a two-stripe lieutenant R.N. or a captain in the Army.

He has been apart from all the R.N.A.S. intrigues all these years, and especially these last months. He is a strong man, who, when once he has made up his mind—which, fortunately, is generally in the right direction—insists on having his own way.

The straightening out of the R.N.A.S. is a man's job, and I believe Commodore Paine is the man to do it. He has the best wishes of everyone who has the good of the Service at heart.

"AVE, ATQUE VALE."

Commodore Sueter's passing recalls another respected custom of our fathers. His fate presents itself to the imagination as a modified version of that of Admiral Byng, a distinguished officer and gentleman, who was shot on his own quarter-deck, as the Emperor Napoleon said at the time, *"Pour encourager les autres,"* after having failed to capture Minorca under impossible conditions with an inadequate fleet.

One hopes, however, that in Commodore Sueter's case he may, in his new sphere of activity, whatever it may be, win high distinction and the honour which is his due, and that in his ventures he may have luck on his side and freedom from any intrigues which might hinder his operations against the enemies of the Empire.

There is not one among the really good officers of the R.N.A.S. who does not hold Commodore Sueter in high personal regard. Even those who may have differed from him on matters of policy, or routine, or on technical points, esteem his breadth of vision, his far-sightedness, and his devotion to his duty as he saw it. His personality can best be described by the French word *sympathique,* which has no exact equivalent in English, and the best officers in the Service were drawn to him by pure friendship, quite as much as by their sense of loyalty to a superior officer.

Like all men who work with a single object in view—in his case the welfare of the R.N.A.S.—he made enemies: some of them open, honest, and respected enemies who disapproved of his policy and his methods, but many of them sneaks who worked behind his back to encompass his downfall to save themselves. The time may yet come when these latter will regret the day when they took part in those intrigues.

Whatever may be the fate, or the development, of the Royal Naval Air Service in the future, whatever may be the outcome of sea-flying in war or peace, whatever our Naval aviators may do against enemy fleets on sea or in air in time to come, let it be remembered that the man who was the father of it all, the man who devoted seven of the best years of his life to the building up of Naval Aeronautics, was Murray Sueter, Post-Captain and Commodore in the Navy of His Majesty King George V. This is a matter of History.—C. G. G.

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TRAINING.—IV.

BY "BERKELEY."

The tactical disposition of the fighting troops during an action is by no means the most complicated section of operation orders prepared for an imminent battle in a campaign of open warfare. History, as taught to the youth of a nation, is made up of a series of incidents loosely strung together in turgid prose with much of the life-giving detail omitted.

Who in reading of Ramillies or Malplaquet ever gives a thought to the necessary meals taken before and after the battles, or wondered from where or in what manner the food arrived? The battles of the Peninsular War pass by in brilliant succession with the months of waiting and the hundreds of miles of weary marching left unmentioned in a dim obscurity.

Supply Problems.

In those earlier days the greatest problem of war was supply and transport. Much of the food consumed could be drawn from the lands through which the troops passed, as armies were then on an infinitely smaller scale than is now the case. But the collection required a special personnel, generally recruited from the minor swindlers of the day.

Apart from food, all things used by the Army had to be transported with infinite difficulty, with great slowness and insecurity, over roads which rivalled the worst of to-day. Even food in a large degree had to be shipped from England.

No miscalculation could be tolerated, for mistakes in those days of slow travelling would take weeks to correct, even if time were available. But sutlers and commissaries of supply have given no public heroes to history. Their work was of vital importance, though much of it must have vanished unrecorded when victory gave due reward to the combatant soldier.

To-day the problem of supply is not less vital, despite the advantages of the accumulated skill of the ages.

Bully-Beef to Breeches.

All things consumed by troops in the field, from bully-beef to howitzers, tooth-brushes to breeches, must be sent forward from the great depots at home. The work is never ending. The movements of the current day and the requirements of a year hence must needs receive parallel attention.

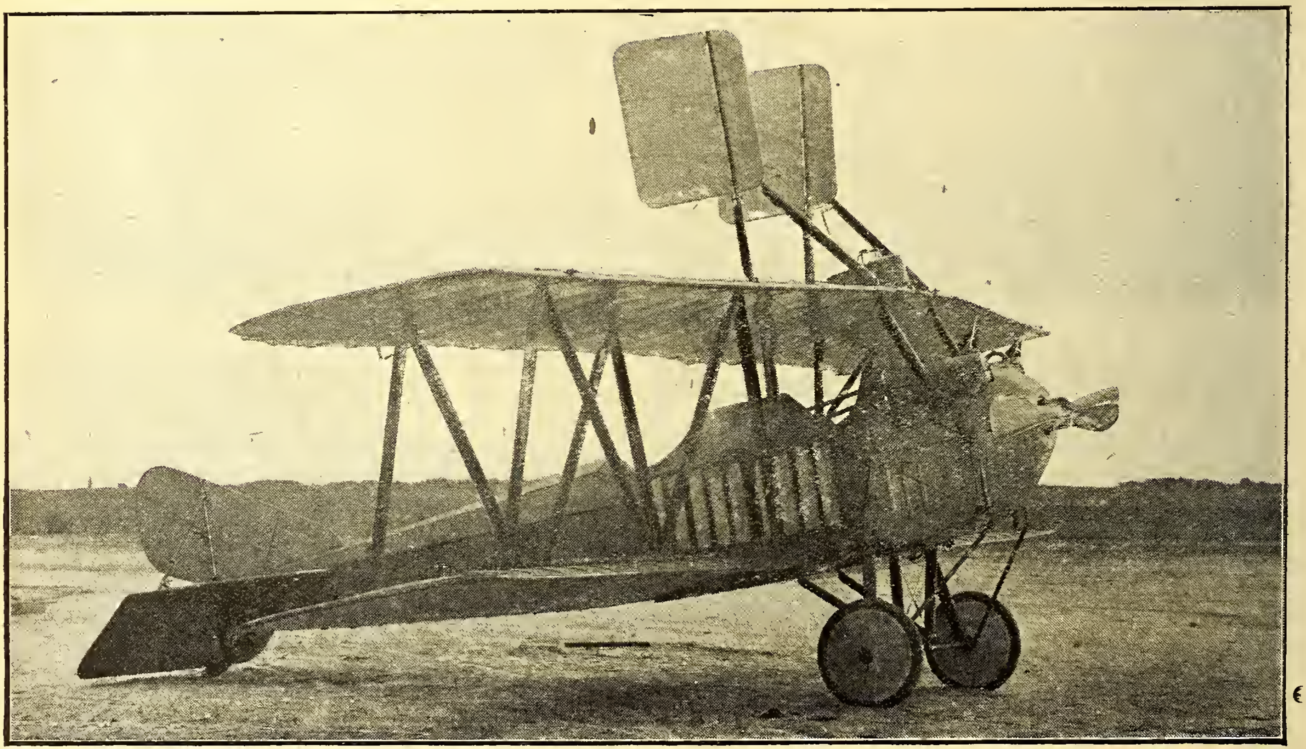
But in the periods before, during, and after a general action the work of supply takes on an added importance. The most brilliant of tactical successes gained by a combination of the skill of the commander and the steady fighting of the troops are all unavailing if the great system behind the lines fails for even a day.

Ordnance Matériel.

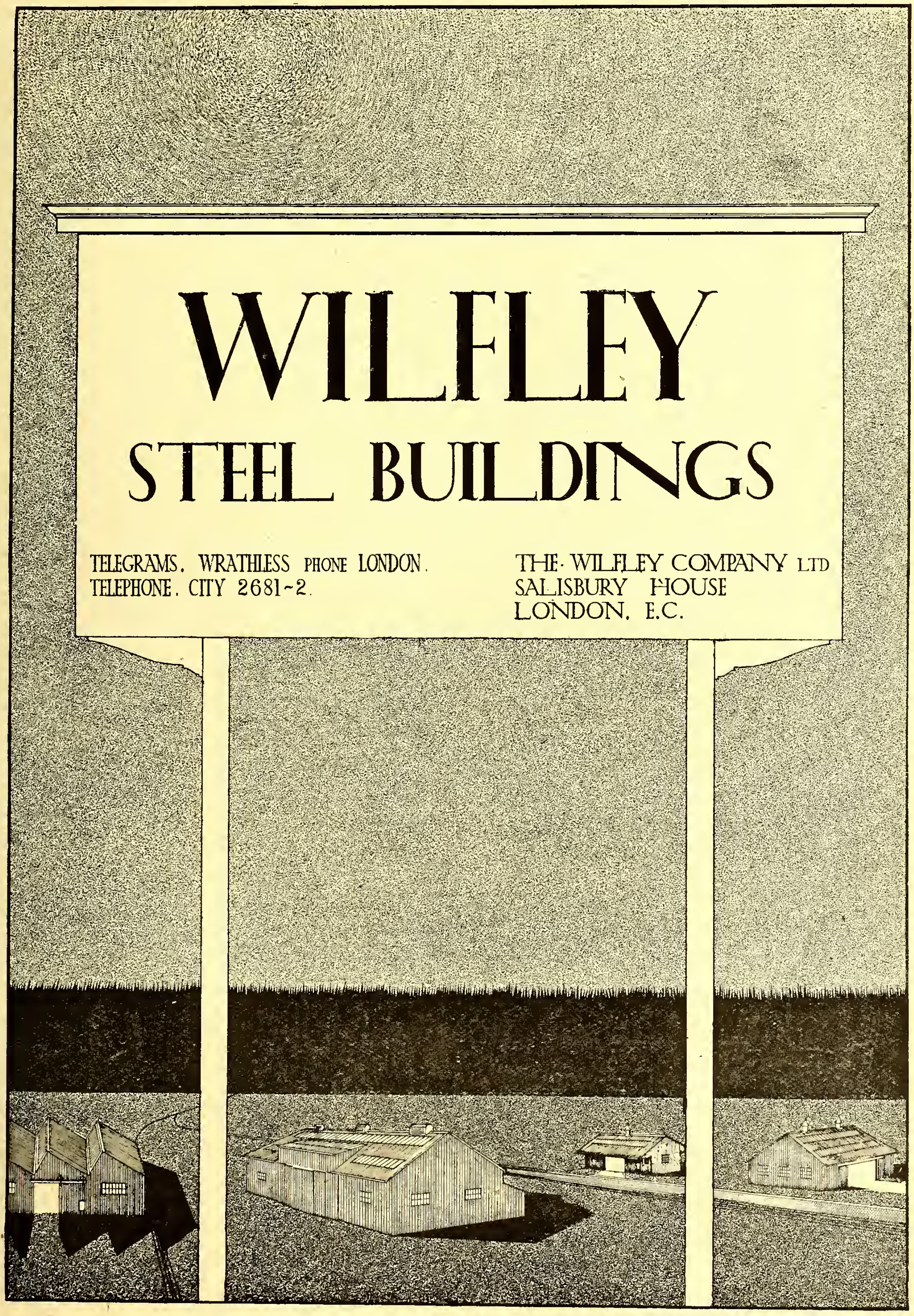
The term Supplies, as used in the previous paragraphs, is intended to include, beyond the usual acceptation of the word, the matériel dealt with by Ordnance Services. The conditions regulating each are essentially the same, and the difficulties encountered do not vary.

In so far as food is concerned, each soldier carries with him his iron ration, which is sufficient, if carefully used, to last forty-eight hours, though in effect it is designed for a period of twenty-four hours. Further rations are carried with the travelling kitchens. Beyond that, reliance must be placed on the antennæ of the main source of supply—the trains and M.T. column supplies.

Similarly in the case of ammunition, both for artillery and the rank and file. An initial supply is carried in the limbers and with the battalions for preliminary use in action. With artillery, reserve ammunition is carried by the brigade ammunition column and in a higher degree by the divisional ammunition column. Small-arms ammunition, after exhaustion of first-line supplies, is drawn from the regimental reserves, after which requisition is made on the brigade ammunition column, as in the case of artillery.



A SPANISH "DELTA" TYPE BIPLANE: A rather unusual attempt at attaining lateral stability. Mr. A. V. Roe built a monoplane with a high fin area, on a similar plan, several years ago for a Portuguese officer.



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LAST RESOURCES.

Behind the divisional ammunition column are the ammunition parks, which are in effect the last resort in a general action. If supplies from this source should ever become exhausted, the wisest course to the commander is to lose the battle without argument.

An encounter battle is, if possible, in the generality of cases, designed with a view to victory, immediate or ultimate, as the strategy of the day dictates. Defeat is only considered as a last resort, and then only by the wisest generals.

A victory, if decisive, implies an advance. If indecisive, it is but another name for defeat.

EXTENSION OF LINES.

The contemplation of an advance renders necessary plans for the extension of the lines of communication. The immediate antennæ of supply must be moved farther forward by the degree of victory. In turn a new advanced base must be brought into being, and the old time-table vanishes into history.

A few hours' difference in the time of departure of each section of matériel must be made in the home depots, in order that the striking force shall not lose in energy or decision by lack of necessary sustenance.

The lengthening of lines of communication not only causes an alteration of time-table, but it adds to the quantities of supplies required.

The L. of C. lengthen, and the number of men employed therein increases. More personnel is required to carry out the technical work of supply, and far greater numbers of troops are necessary for purposes of protection. All these must be fed and maintained before the fighting troops receive a fragment of sustenance. It may not be laid down as an essential in theory that L. of C. troops have a priority of claim, but in practice they assert effectively their right.

TRANSPORT PROBLEMS.

Transport must be so arranged as not to interfere with the movements of reserves and replacements. Not only have supply wagons to reach the fighting troops from railhead (the principal base in rapid touch with home), but they must return promptly and without confusion.

In the years immediately before the war there was an occasion when on the annual manœuvres a new experiment was tried in the matter of first-line transport, which endeavoured to keep, throughout all operations, in close touch with the first line. It took one day to get into touch, and three weeks to extricate the muddle, during which the centre of England was a *terra incognita* even to the ubiquitous commercial traveller.

Under normal conditions, as victory rewards the forces, the front widens, and additional complication enters into the life of the transport officer. The number of railheads, if it be possible, increases, and the complication does not decrease.

But victory brings its own solution. To the victor there is time to adjust difficulties and correct mistakes. The enemy is momentarily crushed, and enthusiasm supplies the additional spur to the victorious army. It is defeat rather than victory that brings the problems.

CRUMPLING UP.

In defeat an army is driven back against its will and in opposition to all preconceived arrangements. Less space is available for its movements than would have been the case either in stalemate or victory.

Infantry, cavalry, and artillery in complete deployment must of necessity retire over roads and open spaces already crowded with an orderly stream of transport conveying supplies, ammunition, and casualties. The dismay of failure and the rapid accretion of heavy losses due to the repulse militate against calmness and considered movements.

It is under these conditions that one of the most brilliant sides of General Staff work comes into prominence. The faculty of the higher command to coordinate the movements of an army under all conditions is now demonstrated in the armies of those whom the gods have not favoured.

ECONOMY OF ROADS.

In modern times, with a comparatively rapid system of transport—at least double the speed possible in the armies of Wellington is now common—the large size of the bodies of troops engaged necessitate the most economic and constant use of roads available. Each vehicle approaching the front must be balanced by a retiring conveyance.

All transport movements, whether the wounded or ammunition or food is being conveyed, must conform to a pre-arranged plan, no less complex and no less perfect than is a page of Bradshaw's time-table dealing with an English railway in the last past year of grace.

It can be readily imagined to what confusion an ill-arranged scheme of transport can bring an army. Masses of men, horses, and vehicles become intermingled into an incoherent turmoil, completely at the mercy of a determined enemy. A tactical defeat becomes a strategic defeat of the first order, and disaster may as a result fall upon the entire nation.

PREPARATION FOR THE WORST.

Thus in operation orders while the possibilities of victory are admitted and preparation is made for a collection of the due fruits, the constant imminence of defeat is never forgotten. For victory advanced bases are plotted on the map many miles behind the enemy's lines, and arrangements are made for occupation on an allotted date.

For defeat, on the other hand, a concentration or series of concentrations is laid down in order to give transport an opportunity to extricate itself without unduly controlling the freedom of movements of the fighting arm. The fighting troops should concentrate while the transport disperse over a fan-shaped area in order that as much space as possible is freed in the shortest time available.

A proper appreciation of these points may assist young officers of the Royal Flying Corps to understand the difficulties attending the transport of aircraft supplies, and the consequent worries of Park and Depot commanders.

(To be continued.)

* * *

THE ROYAL FLYING CORPS AID COMMITTEE.

Socks, mufflers and cardigans are urgently needed for men of the R.F.C. overseas. Lady Henderson will be most grateful for any gifts sent to her at Surrey House, Marble Arch, W.

COMPARATIVE LOSSES.

In the German communiqué for Feb. 9th it is stated that during January the English, French and Russians lost 55 aeroplanes in aerial fights or by the action of anti-aircraft guns, while the German losses in the same period were only 34.

During January Sir Douglas Haig recorded the destruction of 21 German aeroplanes on the British front, 14 others being driven down in a damaged condition. The French Staff reported the destruction of 19 German machines.

This makes a definite total of 40, without the 14 admitted doubtful on the British front. Probably some are doubtful in the French 19. There may have been some German machines brought down on the Russian front, so the German admission of 34 lost completely with their crews is probably not far wide of the mark.

Machines driven down "damaged" in their own lines would hardly be counted as "lost" by the Germans, and presumably Sir Douglas Haig's officially reported losses of 15 machines refer to those which failed to return, and do not include any which may have descended damaged or may have been smashed in "peace accidents" on aerodromes in France.

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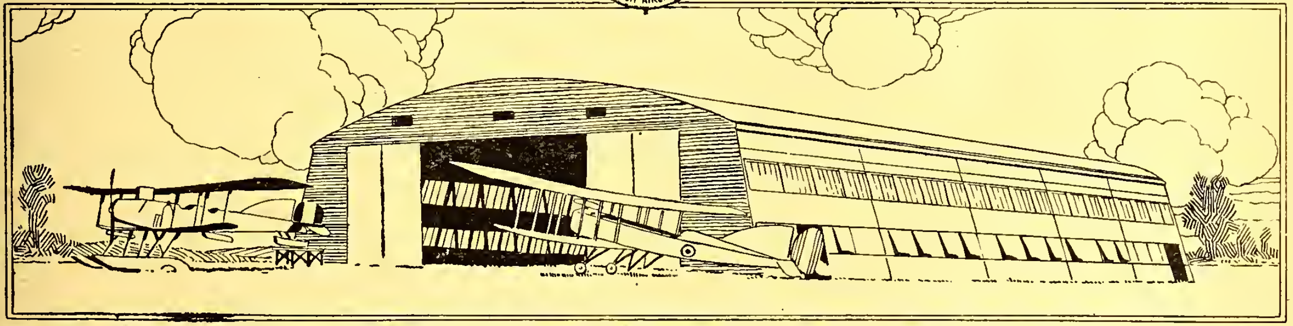


NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Feb. 6th, 1917.

ADMIRALTY, Feb. 2nd.

R.N.A.S.—Flt. Sub-Lt. A. B. Helbert, who relinquished his commn. on account of ill-health contracted in the Service, to retain his rank.

Flt. Sub-Lt. A. O. Brissenden, who relinquished his commn. on account of injuries sustained on active service, to retain his rank.

With reference to notice which appeared in the Third Supplement of "London Gazette," dated Dec. 29th, 1916, page 13, the seny. of Flt. Lt. J. A. Barron should be Oct. 1st, 1916, and not as therein stated.

Flt. Sub-Lt. to be Flt. Lts.—F. L. C. Butcher, E. K. H. Turnour, H. S. Scroggs, A. L. White, D. Don, R. S. Montagu, H. V. Drew, C. S. Coltson, R. V. Goddard, Dec. 31st, 1916.

Temp. Proby. Flt. Officer to be temp. Flt. Sub-Lt.—C. H. Keith, Oct. 10th, 1916.

WAR OFFICE, Feb. 6th.

REGULAR FORCES. — ESTABLISHMENTS. — R.F.C. — Flt. Comdrs.—From Flying Officers:—Capt. L. Wanless-O'Gowan, Sco. Rif.; Capt. J. A. Dennistoun, 8th Can. Inf. Bn., Jan. 1st. Lt. (temp. Capt.) F. P. Don, Sco. Horse Yeo., T.F., and to retain his temp. rank whilst so employed. From Flying Officers, and to be temp. Capts. whilst so employed:—Lt. A. T. Williams, R.W. Kent R.; Sec. Lt. (temp. Lt.) R. S. McClintock, W. Lancs. Brig., R.F.A., T.F.; Lt. L. G. S. Payne, Suff. R.; Lt. E. E. Barnes, R.E., Spec. Res.; temp. Sec. Lt. (temp. Lt.) T. A. Oliver, Gen. List; temp. Sec. Lt. (temp. Lt.) A. D. Pearce, Gen. List; Lt. L. J. Bayly, R.A.; temp. Sec. Lt. J. N. MacRae, Gen. List; temp. Sec. Lt. B. E. Baker, Gen. List; temp. Sec. Lt. H. L. Chadwick, Gen. List; temp. Sec. Lt. C. Seedhouse, Gen. List; temp. Sec. Lt. F. H. Coleman, Gen. List; Sec. Lt. J. S. Beatty, Spec. Res.; Sec. Lt. A. K. Tylee, Spec. Res.; temp Sec. Lt. L. L. Richardson, Gen. List; Sec, Lt. R. J. Bennett, Spec. Res.

Flying Officer.—Temp. Sec. Lt. C. G. Lush, R.W. Kent R., from attd. R.W. Kent R., T.F., Dec. 31st, 1916.

Equipment Officers, 2nd Cl.—Lt. C. St. Noble, Spec. Res., from the 3rd Cl., Sept. 26th, 1916; temp. Capt. F. R. Williams, Gen. List, from the 3rd Cl. From the 3rd Cl., and to be temp. Lts. whilst so empld.:—Sec. Lt. K. D. G. Collier, Spec. Res.; Sec. Lt. H. A. Browne, Spec. Res.; Sec. Lt. E. L. P. Morgan, Spec. Res.; Sec. Lt. L. Bawn, Spec. Res.; Sec. Lt. I. N. Dracopoli, Spec. Res.; Sec. Lt. (on prob.) C. A. Cuthbert, Spec. Res.; Sec. Lt. P. Young, Spec. Res., Dec. 1st, 1916; Sec. Lt. E. S. Cohen, Spec. Res., Jan. 1st; Lt. N. C. F. Francis, Spec. Res., from a Staff Lt., Jan. 4th. From the 3rd Cl.:—Sec. Lt. R. E. H. Daniel, Spec. Res., and to be temp. Lt. whilst so empld.; Sec. Lt. (temp. Lt.) J. H. Rutherford, Lond. R., T.F., and to retain his temp. rank whilst so empld., Jan. 10th; temp. Sec. Lt. J. Inwood, Gen. List, and to be temp. Lt. whilst so empld., Jan. 13th; Sec. Lt. (on prob.) G. J. C. Gunn, Sco. Rif., Spec. Res., Jan. 25th.

3rd Cl.—Sec. Lt. (on prob.) C. L. Hardy, Spec. Res., Jan. 1st.

INFANTRY.—MIDD'X R.—Temp. Sec. Lt. C. F. Matthew, from Gen. List (R.F.C.), to be temp. Sec. Lt. (attd.), Feb. 7th, seny. from July 7th, 1916.

A.O.D.—1st Cl. Air Mech. H. M. Lawson, from R.F.C., Jan. 6th.

SPECIAL RESERVE OF OFFICERS. — SUPPLEMENTARY TO REGULAR CORPS.—R.F.C.—Sec. Lt. H. R. Gillespie resigns his commn., Feb. 7th. Sec. Lts. (on prob.) confirmed in their rank: D. T. Steeves, T. Elder-Hearn, F. A. Shippam to be Sec. Lt., Sept. 5th, 1916. To be Sec. Lts. (on prob.):—E. C. Fowler, Nov. 13th, 1916; M. M. Merriman, H. A. C. Parker, Jan. 1st; D. Richardson, Jan. 8th; D. E. Rodwell, Jan. 15th. The appt. of Sec. Lt. (on prob.) R. C. Steele, notified in "Gazette" of Oct. 23rd, 1916, is antedated to Sept. 21st, 1916.

TERRITORIAL FORCE. — R.F.A. — Sec. Lt. H. Forrest is secd. for duty with the R.F.C., Jan. 25th.

* * *

The King has been pleased, by Letters Patent under the Great Seal, bearing date January 11th, 1917, to appoint:—

Captain (Commodore 1st Class) GODFREY MARSHALL PAINE, C.B., M.V.O., to be Commissioner for executing the Office of Lord High Admiral of the United Kingdom of Great Britain and Ireland, etc.

* * *

From the "London Gazette" Supplement, Feb. 7th, 1917.

WAR OFFICE, Feb. 7th.

REGULAR FORCES. — ESTABLISHMENTS. — R.F.C. — Sqdn. Comdr.—Lt. (temp. Capt.) F. F. Minchin, M.C., Spec. Res., from a Flt. Comdr., and to be temp. Maj. whilst so empld., Jan. 1st.

Flying Officers.—Temp. Lt. S. Wyborn, Gen. List, Dec. 31st, 1916; Sec. Lt. F. H. Astle, Ches. R., T.F.; Sec. Lt. G. W. Benson, W. Rid. R., T.F.; Sec. Lt. E. Blythe, L'pool R., T.F., Jan. 16th; temp. Lt. H. L. Satchell, attd. R. War. R.; temp. Lt. P. T. Bowers, A.S.C., and to be transfd. to Gen. List; temp. Sec. Lt. C. W. D. Holmes, attd. Bedf. R., Jan. 17th; Sec. Lt. R. Smith, Yorks L.I., Spec. Res., and to be secd.; temp. Sec. Lt. O. W. Berry, attd. K.O. Sco. Bord.; Capt. E. W. Bowyer-Bower, E. Surr. R., Spec. Res., from a Flying Officer (Observer), seny. June 19th, 1916; Sec. Lt. (temp. Lt.) R. C. Allen, N. Rid. Brig., R.F.A., T.F.; Sec. Lt. E. F. Haylock, Essex R., T.F.; temp. Sec. Lt. E. P. Morris, E. Kent R., Jan. 18th; temp. Lt. H. J. G. Newman. Lan. R., and to be transfd. to Gen. List; temp. Sec. Lt. H. F. McLoughlin, Gen. List; Sec. Lt. (on prob.) A. B. Morgan, Spec. Res., Jan. 20th; Sec. Lt. J. Grieve, S. Lan. R., Spec. Res., and to be secd., Jan. 21st.

Flying Officers (Observers).—Sec. Lt. H. W. B. Rickards, R.A., and to be secd., Nov. 12th, 1916. The notification in the "Gazette" of Nov. 28th, 1916, regarding Sec. Lt. (temp. Capt.) H. G. Rickards, Lond. (Howitzer) Brig., R.F.A., T.F., is cancelled.

Balloon Officer.—Capt. L. V. S. Blacker, Corps of Guides, Ind. Army, Nov. 29th, 1916, seny. Dec. 3, 1915.

Adjt.—Capt. Le G. G. W. Horton, K.R. Rif. C., and to be secd., Jan. 22nd.

Equipt. Officers, 2nd Cl.—Sec. Lt. (temp. Capt.) N. M. Halcombe, Welsh Field Co., R.E., T.F., Dec. 16th, 1916; temp. Lt. S. B. Smith, Gen. List, from a Flying Officer, Jan. 23rd.

3rd Cl.—Sec. Lt. F. A. Shippam, Spec. Res., Dec. 6th, 1916.

Experimental Officers, 1st Cl.—(Graded as an Equipt. Officer, 1st Cl.)—Sec. Lt. (temp. Lt.) W. R. G. Atkins, Spec. Res., from the 2nd Cl., and to be temp. Capt. whilst so empld., Nov. 25th, 1916.

3rd Cl.—(Graded as an Equipt. Officer, 3rd Cl.)—Sec. Lt. (on prob.) C. E. Fairburn, Spec. Res., Jan. 13th.

SPECIAL RESERVE OF OFFICERS. — SUPPLEMENTARY TO REGULAR CORPS.—R.F.C.—Sec. Lt. R. W. Jones resigns his commn., Feb. 8th.

* * *

From the "London Gazette" Supplement, Feb. 8th, 1917.

WAR OFFICE, Feb. 8th.

REGULAR FORCES. — ESTABLISHMENTS.—R.F.C.—Equipt. Officers, 1st Cl.—Temp. Maj. S. Janson, A.S.C., Jan. 25th.

3rd Cl.—Sec. Lt. (on prob.) L. G. Fenner, Spec. Res.; Sec. Lt. (on prob.) L. Crooks, Spec. Res., Dec. 13th, 1916.

SCHOOLS OF INSTRUCTION.—SCHOOLS OF MIL. AERONAUTICS.—Instrs. (graded as Equipt. Officers, 1st Cl.).—Sec. Lt. (temp. Lt.) G. A. Turner, Dorset R., Spec. Res., from an Asst. Instr., and to be temp. Capt. whilst so empld., Jan. 24th; Capt. V. O. Rees, Lond. R., T.F., from an Instr. (graded as an Equipt. Officer, 2nd Cl.), Dec. 30th, 1916.

Asst. Instrs. (graded as Equipt. Officers, 2nd Cl.).—Dec. 30th, 1916:—Sec. Lt. (temp. Lt.) A. C. Bishop, Berks Yeo., T.F., from an Equipt. Officer, 3rd Cl., and to retain his temp. rank whilst so empld. From Equipt. Officers, 3rd Cl., and to be temp. Lts. whilst so empld.:—Sec. Lt. G. A. Turner, Dorset R., Spec. Res.; Sec. Lt. (on prob.) H. E. Earl, Rif. Brig., Spec. Res.; temp. Sec. Lt. A. D. Bateman, Gen. List; Sec. Lt. R. T. Lattey, Spec. Res.; Sec. Lt. P. Craven, Spec. Res.; Sec. Lt. J. McCrae, Sea. Highrs.; Sec. Lt. C. R. Fleming-Williams, Spec. Res.; temp. Sec. Lt. F. H. Hawksford, Gen. List; temp. Sec. Lt. J. A. Payne, Gen. List; Sec. Lt. H. E. Jarman, Spec. Res.; Sec. Lt. A. C. Day, Spec. Res.

WIRELESS AND OBSERVERS SCHOOL.—Instrs. (graded as Equipt. Officers, 2nd Cl.):—From Equipt. Officers, 3rd Cl., and to be temp. Lts. whilst so empld.—Sec. Lt. W. H. Date, Spec. Res.; Sec. Lt. S. Turner, Spec. Res., Jan. 6th.

ROYAL REGT. OF ARTILLERY. — R.G.A. — Temp. Capt. W. A. Burns relinquishes his commn. on appt. to R.N.A.S., Feb. 27th, 1915.

MEMORANDUM.—Qrmr. and Hon. Lt. E. J. Parker, M.C., R.F.C. (Mil. Wing), to be temp. Hon. Capt. whilst a Camp Comdt., March 12th, 1916.

SPECIAL RESERVE OF OFFICERS. — SUPPLEMENTARY TO REGULAR CORPS.—R.F.C.—Sec. Lt. (on prob.) W. Noble resigns his commn., Feb. 9th.

TERRITORIAL FORCE.—YEOMANRY.—Sec. Lt. L. H. Hansen is secd. for duty with the R.F.C., Jan. 5th.

Sec. Lt. J. de Conway is secd. for duty with the R.F.C., Jan. 8th.

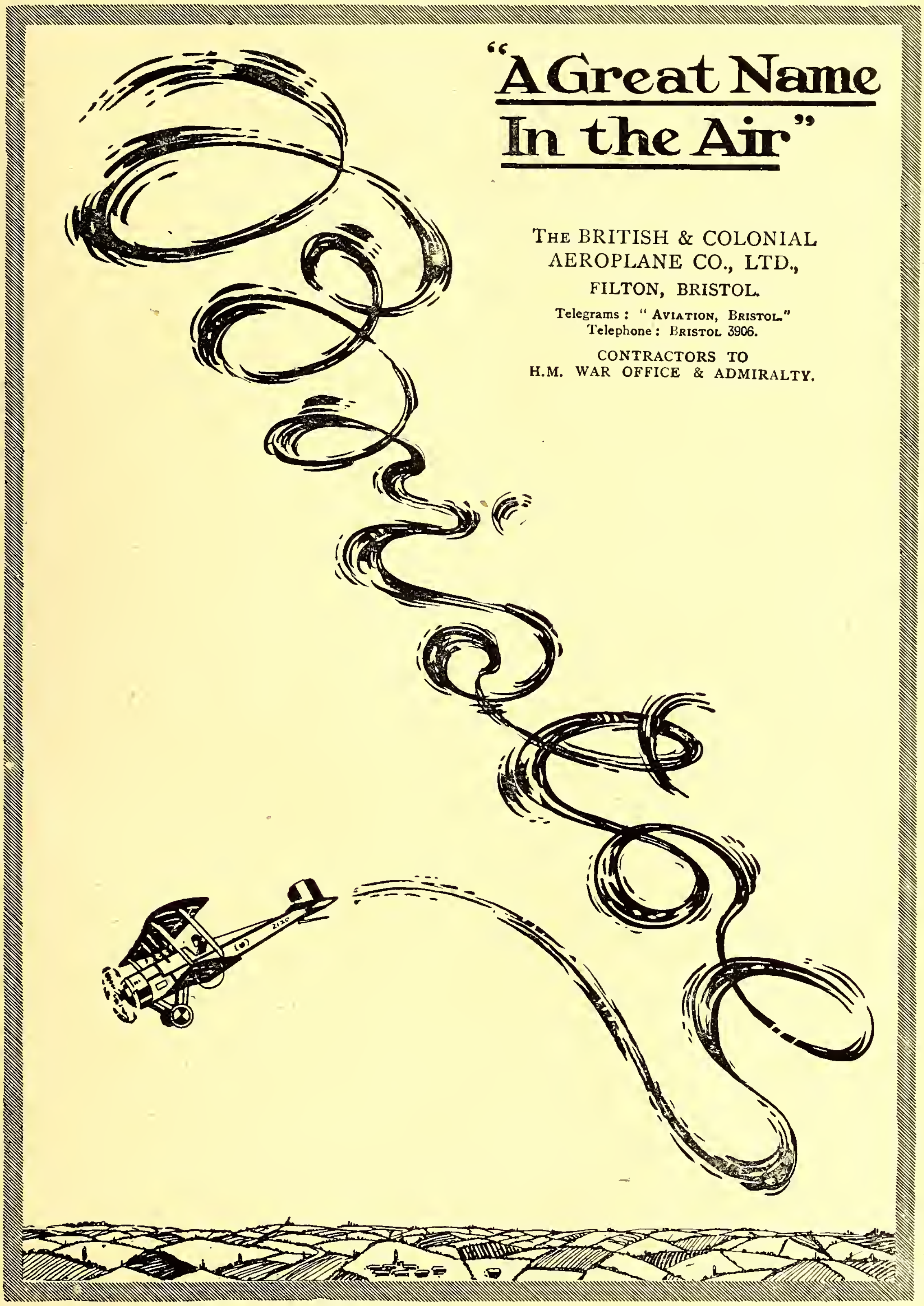
* * *

A Supplement to the "London Gazette" dated Feb. 8th contained a dispatch from Lieut.-Gen. the Hon. J. C. Smuts, Commander-in-Chief, East African Forces. Among the names of those mentioned for meritorious service in the field were the following officers and men of the R.N.A.S. and R.F.C.:—

R.N.A.S. — Robinson, Temp. Flt. Sub-Lt. J., Naval Wing; Stewart-Dawson, Temp. Flt. Sub-Lt. N. G., Naval Wing.

Russel, No. 226512 C.P.O., 3rd Grade, H.; Brooke, No. F.7963 Leading Mech. S. A.; Chapple, No. E.7181 P.O. Mech. W. A.

(Continued on page 460.)



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SUPPLEMENT TO "THE AEROPLANE"

INCORPORATING AIRCRAFT ENGINEERING, AERODYNAMICS, AND MATTERS PERTAINING TO THE AERONAUTICAL ENGINEER AND THE AIRCRAFT TRADER

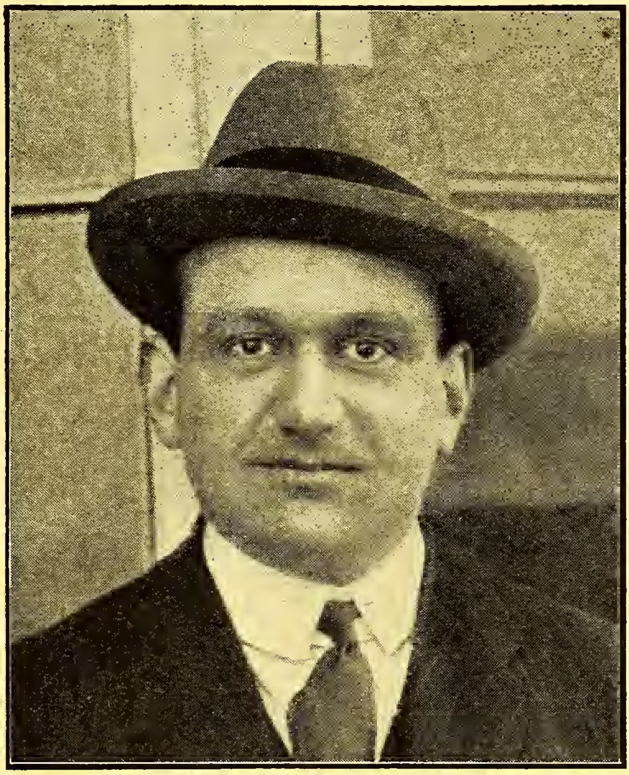
The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

III.—HANDLEY PAGE, LIMITED.

There is not a little to admire in the career of Mr. Frederick Handley Page. To those who only know of what his firm is doing in the way of producing war machines in the shape of giant biplanes, capable of carrying bombs by the ton, it might appear that he had been "made by the war" alone. As a matter of fact, he is one of our most patient and scientific experimentalists, and the way in which he has pursued his line of thought for over ten years, undaunted by any failures, and with the single object in view of evolving a perfect machine, is worthy of the highest praise.



Mr. Frederick Handley Page.

The war has made the aircraft industry a great one—how great it is one of the objects of this series of articles to reveal; but equally is it their purpose to pay tribute to the efforts and achievements of the pioneers, and to show how much had been accomplished before the country was called to arms. And in that band of early workers Mr. Handley Page indubitably holds an honoured place.

THE BEGINNING OF EXPERIMENTS.

It was in 1906, the year in which Santos Dumont abandoned his "lighter than air" predilections, that Mr. Page's interest in aviation was first aroused, and he conceived a scheme for the making of a "bird" machine. At that time he was chief designer to Johnson and Phillips, of Charlton, a well-known electrical firm. In his own sphere as an electrical engineer he was recognised as a young man of promise, and attracted considerable attention by a paper which he read in the following year before the Institute of Electrical Engineers on "The Design of Direct Current Machinery."

AN AMERICAN OFFER.

It was as a result of this, in fact, that he received a tempting offer in 1908 from the Westinghouse Company, of Pittsburg, of going over to take up experimental work. The company offered him his passage out, a lucrative salary, and his return passage money if he did not elect to stay more than six months. But he was already too keen on aviation to accept this opening, and the fact deserves mentioning in the light of a criticism that has been unkindly alleged against aeroplane constructors, to the effect that they are men who have "failed at everything else."

None will deny that Mr. Handley Page deserves every credit for his pluck in turning the Pittsburg offer down, and for his foresight and his faith in the future possibilities of aviation science.

A FLAPPING WING MACHINE.

He had, in fact, already been conducting aerial experiments for over a year. Very curious and interesting was his first conception, of which he showed me a sketch; it took the form of a small box-kite, centrally mounted on a pair of wings worked by cranks! Of course, as Mr. Handley Page himself humorously remarked, it was "a most outrageous idea"; but it was evolved in 1906, and who was much the wiser in those days?

Throughout 1907 he experimented with small gliders, with bird-shaped wings, and also with propellers, chiefly in conjunction with Mr. José Weiss, a landscape painter, of Arundel.

AERONAUTICAL ENGINEERING.

Then came the great plunge, for in 1908, after declining the American offer, he started a business as an aeronautical engineer, and on June 17th, 1909, converted it into a limited company. Works were erected at Barking covering about 10,000 sq. ft., solely for the construction of aeroplanes—truly a venturesome move. Adjoining the works was a dump, on the banks of the river, which served conveniently as a gliding station, and there was also a flying ground, of about two square miles in extent, quite flat, but broken up by dykes.

The first machine to be turned out and flown was a small monoplane, known as the "Bluebird," partly because of its curved planes, and partly because it was painted blue. The design was original throughout and in no sense a mere copy of the Blériot.

The "Bluebird" was fated to meet an untimely end on the flying ground at Barking, but was followed by various other monoplanes, which Mr. Handley Page now complacently describes as "more or less duds." An experimental biplane was also built in that year for Mr. W. R. Thompson of Liverpool, and those who remember the first Olympia Aero Show, in 1909, will recall a Handley Page monoplane there exhibited, designed by Mr. José Weiss. Another monoplane was also shown at the exhibition of 1910, fitted with a horizontal engine with two opposed cylinders.

INHERENT STABILITY.

Experimentation work was sedulously continued, and always, be it mentioned, on the lines of inherent stability, of which Mr. Handley Page has ever been the ardent apostle. But the engine question was an ever-present difficulty, and it was not until the end of 1911 that he produced what he regards as his first really successful machine.

This was a monoplane, fitted with a 50-h.p. Gnome motor. By its pilot, Edward Petre, known as "Peter the Painter," it was fancifully christened the "Antiseptic," because it was painted with non-rusting paint. The machine was exhibited at Olympia, and, in the hands of "Peter the Painter," made various flights, one of which was from Fairlop, near Ilford, to the works at Barking.

The planes, it may be mentioned, had a span of about 35 ft., and the engine was enclosed in a cowl. Save for the engine, every part of the machine, which was capable of a speed of from 55 to 60 m.p.h., was constructed in the firm's own workshops.

Through London.

In May, 1912, it was flown through London by "Peter the Painter" from Barking, following the line of the river for several miles, and finishing at Brooklands. The "Antiseptic" is still preserved intact, hanging from the roof of the present works at Cricklewood, and nothing would induce Mr. Handley Page to part with this treasured memento of an initial triumph.

A larger machine followed, with a 70-h.p. Gnôme, and designed for the military competitions of 1912.

War Office Contracts.

The War Office then entrusted the firm with the making of machines of the B.E. type. It was in the same year that the removal to Cricklewood was made. In the first instance the ground occupied was about five acres. The workshops have since been doubled in size.

While engaged on the War Office contract the firm was also busy with experimental work of its own, and eventually brought out a biplane with a 110-h.p. Anzani engine. This machine had a speed of 73 m.p.h., and was flown at the Buxton aviation meeting, and later at a similar gathering at Hull.

Here, by the way, there was a storm within a teacup on the subject of Sunday flying, and there were threats of a prosecution under the Lord's Day Observance Act. As a photograph of that date shows, the opposition to the meeting went so far as to produce a big posse of policemen on the flying ground on the Sunday morning ready to intervene; but the programme was duly carried out, none the less, and no prosecution followed. Mr. E. R. Whitehouse, now Flight-Commander, R.N.A.S., was the pilot on this occasion.

During the War.

A new type, with a 200-h.p. Salmson motor, was just being perfected when the war broke out, and the firm was promptly taken over by the Admiralty. Since then, as is well known, the works have been engaged on the production of "giant" machines, as to which Mr. Handley Page had much that was highly interesting to say and show in his lecture to the Aeronautical Society, at the Society of Arts, on the 7th inst.

Lest it be supposed that the giant type is entirely a product of the war, it may be pointed out that the firm had been experimenting with big machines before the opening of hostilities. They submitted a scheme to the Admiralty, and were asked to build to the latters' specifications.

It may also be mentioned that the subject of bomb-dropping was studied by the firm with such success that most Admiralty machines now used for raiding purposes are fitted with the Handley Page patent bomb-dropping gear.

Aeronautical Society Work.

A member of the Council of the Aeronautical Society, Mr. Handley Page has read numerous papers to that body on various scientific aspects of aviation.

He is also immensely interested in educational matters, and for the past five years has given lectures and conducted laboratory classes at the Northampton Institute in Clerkenwell.

The Welfare of the Workers.

If there is one thing above another of which he is specially proud, perhaps even more so than of the fact that one of his machines was the first to rise to 7,000 ft. with twenty passengers and a pilot on board, it is the success he has made of his workshop canteen! He has always had the welfare of his men at heart, and in the first instance established a messroom in which he undertook to provide the men with dinner at 6½d. a head, whether the firm lost thereby or not.

As a matter of fact, both ends were made to meet; and, having shown how it could be done, Mr. Handley Page turned the whole thing over to the men themselves. They run the mess with their own committee, and buy their own supplies. War prices notwithstanding, the scheme is worked on a surprisingly economical basis, and everybody concerned is pleased, no one more so than the originator of the idea, Mr. Handley Page himself.

* * *

A GERMAN ENGINE.

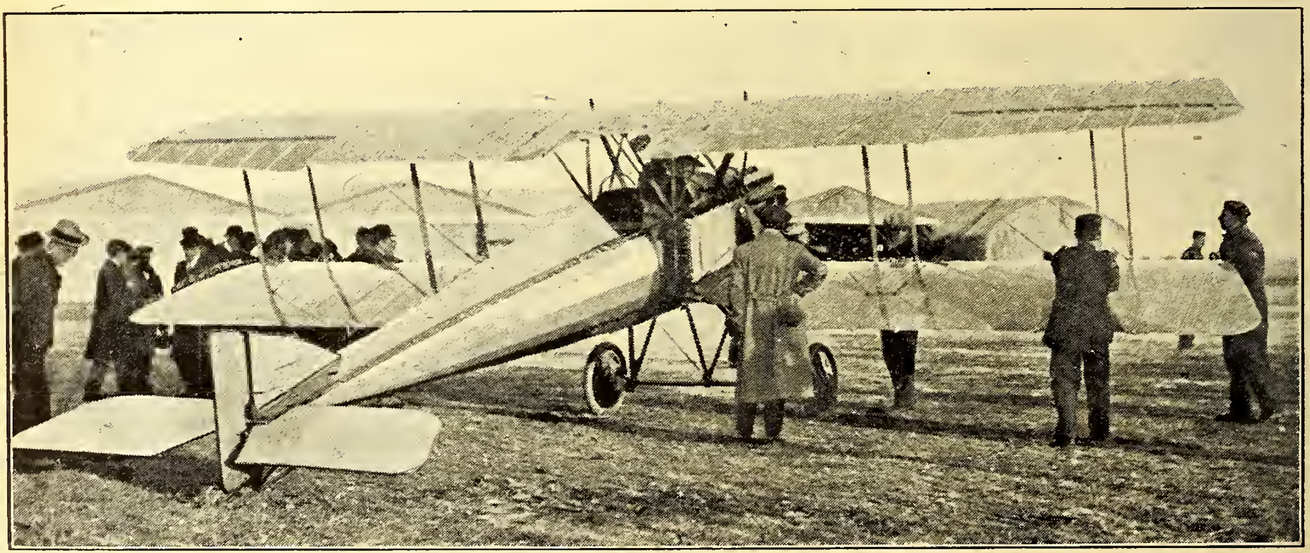
The management of the well-known emporium in Oxford Street, Selfridge's to wit, are ever in the forefront with objects of interest as attractions for probable customers, and a recent side-show was a general exhibition of Hun frightfulness, among which were included some Zeppelin souvenirs in the shape of fragments of deceased airships and of the remains of bombs.

The most interesting exhibit, however, was a German aero-engine which was imported into this country just prior to the outbreak of war. This exhibit was described as "an early Zeppelin engine," but, judging from the nature of the motor, this seems rather improbable. It may possibly have been intended for a small airship, such as the Schütte-Lanz, but it is more probable that it is merely an aeroplane motor.

The engine is a 6-cylinder vertical N.A.G., with cast-iron cylinders and copper water-jackets, the water being supplied to the different cylinders from a manifold running overhead. The engine is fed by a single carburettor, the gas being led through a maze of inlet pipes. The air intake is heated by contact with two of the exhaust pipes. Ignition is by two Bosch magnetos driven from the main shaft. Each cylinder is fitted with one exhaust valve and one inlet valve, both placed oevrhead and connected by push-rods from a cam-shaft in the side of the crank-case. A propeller boss is fitted to the crank-shaft, and seems to dispute the theory that the engine was ever intended for a Zeppelin, and open exhaust pipes jut out from each exhaust port at right angles to the crank-case.

The cylinders are cast separately, and each has two plugs, one of which is connected to each magneto.

The engine is the work of the Neue Automobil Gesellschaft G.m.b.H. (i.e., N.A.G.), of Oberschoneveide, Berlin, who were well known before the war as makers of the N.A.G. motor-cycle, so one imagines that the engine was sent over just before the war in the hopes that the motor-cycle agency might sell some samples to the Flying Services, which were then beginning to display the dawn of intelligence in respect to fixed cylinder engines.



AN INTERESTING SPANISH EXPERIMENT.—A Saulnier biplane belonging to the Spanish Army, fitted with a Hispano-Suiza motor. It will be noted that there is a healthy fixed fin instead of the usual Morane-Saulnier type rudder.

NON-POISONOUS
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The Aeronautical Society of Great Britain.

On Feb. 7th a paper was read at the Royal Society of Arts, John Street, Adelphi, W.C., by Mr. Frederick Handley Page, entitled "The Case for the Large Aeroplane."

Mr. Page said:—"The question of aeroplane size is a most important one. It raises the whole question as to whether there is, or is not, a limitation to aeroplane size, and therefore whether progress in construction will be limited to improvement on present-day small types of machines, or whether there is an infinite possibility in the extension of designs to much larger types.

"It has been argued by many that, just as ships, trains, and other machines for transport purposes increase in size as years go on, so will the aeroplane progress, and that the large aeroplane will have a definite place in the field of aviation. Others have adopted the opposite view.

"The general consideration in favour of the large machine is that although there is a heavier initial capital outlay, large machines are much cheaper to build, cheaper to maintain, and cheaper to run than small ones, and thus progress is seen in every type of mechanical transport towards the employment of larger and larger machines with a view to taking full advantage of the economies effected.

"In the aeroplane there could, however, be no advantage in the use of large machines if that increase in size gives a disproportionate increase in weight which would more than nullify constructional advantages, or if the large aeroplane had aerodynamical disadvantages. The whole case needs very careful consideration from all points of view.

"In the arguments set forth below I have endeavoured to compare machines of different size and review their relative advantages, determining first of all bases of comparison to enable a true picture to be obtained. As these necessitate the explanation of a new method of aero-dynamical comparison, I have set this forth at rather greater length than is necessary for the development of the argument proper. After a discussion of the aerodynamical problem, I have dealt with the effect on structural weight of an increase in the size of aeroplane, and then turned back to find the effect on the aeroplane's performance of the weight variation with size increase. Lastly, there are a few notes on the large machine from a flying standpoint. It is a matter of some difficulty to obtain a true basis of comparison from pilots' opinions. Pilots are, as General Brancker remarked in his paper, a very conservative body, opposed to innovation, and the machine of the moment's design is not necessarily the one of the future, or the one from which future machines will be developed."

Thereafter Mr. Page exhibited on the screen a number of curves and calculations, illustrating the Aero-dynamical Bases of Comparison by which he arrived at his theoretical conclusions.

Increase in Weight.

Continuing, Mr. Page said that the weight of an aeroplane does not increase out of proportion to the size. It will be remembered that in theory the weight of an aeroplane increases as the cube of the dimensions. That is to say, if the size of an aeroplane is doubled the span is twice as great, and a spar will be twice as long, twice as deep, and twice as thick. That is to say, the wood in the spar is cubed in capacity, and therefore weighs eight times as much as in a machine with a spar half the size. This is pure theory and, as Mr. Page pointed out, does not follow in practice.

Mr. Page stated that in small machines limits are reached beyond which members cannot be decreased in size, owing to local stresses. For instance, in tubular members made of wood, it was not advisable for the wood to be less than 5/16 of an inch thick. But that same thickness would suffice for tubes of very much larger diameter. Local strength is necessary on any machine, and consequently material can be better utilised in big machines.

Decreased Structural Weight.

The lecturer stated as the result of experience that the weight of planes per square foot is less in big machines than in small ones, and that the weight of the planes complete is a less percentage of the total weight of the machine than in small ones. Similarly the weight of the fuselage is decreased in proportion to its size. The landing carriage, however, remains about the same.

Pilotage.

He said that it is very difficult to get the opinion of pilots as to the relative merits of big and small aeroplanes, but it could safely be said that a large aeroplane can be flown with as little fatigue as a small one, if the controls are properly designed. One reason is that a big machine is less kicked about by gusts than a small one. And consequently there is less work for the pilot to do. It had been proved that there is no need for a Servo-motor if the control surfaces are correctly balanced. A big aeroplane can be more easily handled on the ground relatively to its size than a small one, and it can be landed in smaller spaces, because apparently it does not run so far after landing, and can be pancaked safely from a greater height.

Big aeroplanes are also more economical to run. For instance, to carry a given load one pilot and one mechanic suffice to handle a machine in the air when carrying a load which would have to be split up between a number of aeroplanes, each requiring a pilot and a mechanic.

Peace Work.

On the question of the use of big aeroplanes for mail carrying in time of peace, Mr. Page admitted that for short distances up to a couple of hundred miles in an ordinary civilised country the aeroplane would have no particular advantage over the railway train, because slight delays caused by fog or bad weather would annul the gain in speed when once the machine started.

But he argued that where really big distances of a thousand miles or more, either over sea or over country without railways or good roads, the aeroplane would score because it could do its thousand miles a day where other vehicles would take several days for the distance, and so could afford to wait a day or two in case of bad weather.

When used for these purposes he pointed out that certainty in operation needs the attention of designers. Engines must be more reliable, and a multiplicity of engines is desirable, so that if one or more go wrong the machine can carry on.

Comparative Performances.

On the question of comparison of performance of big and large aeroplanes, Mr. Page said that it is absurd to compare the performance of a big machine, carrying a large useful load per horse-power with that of a scout carrying a small useful load per h.p.

Mr. Page then illustrated with lantern slides one of his big machines, which carries a useful load of several tons, though he admitted that so far it has only lifted 21 people at a time.

One would enjoin on Mr. Page not to be disheartened on that account, as doubtless he will in due course produce an aeroplane which will carry 50 people in comfort.

Following on his lecture, Mr. Page exhibited a number of exceedingly interesting photographs of his big aeroplanes, and some very informative kinematograph pictures showing the machines flying.

The Discussion.

Professor Lanchester, who occupied the Chair, in opening the discussion, congratulated Mr. Page on his able disquisition.

It was true that some twelve months ago he, Professor Lanchester, had opposed the position forced upon aeroplane constructors when they were asked by popular clamour to build huge battle-planes or "aerial dreadnoughts." For this reason he had made a stand against megalomania on the subject of big aeroplanes.

When the welfare of a country depends on its armament it is as well to go carefully. Now that he had seen the big machines illustrated by Mr. Handley Page, he felt that the designer had at any rate the courage of his convictions. The work of Mr. Handley Page would stand as of great value to future development.

On the engineering side of the lecture there was room for considerable controversy. Mr. Page had said that as the size of an aeroplane increases the structural weight does not increase. The big scale certainly altered the question when one was not working to the same drawings. The economic question as to whether it pays best to build one big aeroplane or many small ones depended at present on the military outlook.

On the question of the various elaborate curves displayed by Mr. Page, Professor Lanchester said that everybody had his own system of curves, and thought that everybody else ought to agree with him, and intimated a doubt as to whether everybody present understood and agreed with the said curves and symbols. He remarked that engineers have a habit of starting these discussions just at dinner time, and when looking at the curves displayed by Mr. Page, he found himself speculating as to whether the symbol "Rho" as Roe (say as caviare) constituted a full course as eggs, or half a course as Hors-d'Oeuvres.

Wing-Commander Malone, R.N., on the subject of the limitation of size for big aeroplanes, hazarded the opinion that some thousands of years ago men probably argued as to whether a ship could be bigger than one man could dig out of a tree with his penknife. (N.B.—Did pre-historic man have a penknife.) The present problem was somewhat analogous. He thought that engineers must abolish limitations of size by introducing new materials into aeroplane construction.

Lt. Archibald Low, R.N.V.R., at the request of Commander Malone, illustrated with lantern slides certain arguments on curves evolved by French aeronautical engineers, concerning the limiting size of aeroplanes, and said that he naturally considered Mr. Page an outrageous heretic, as structural weight must necessarily increase faster than the size of an aeroplane. If it did not increase actually as the cube of the dimensions, there was anyhow a limiting size somewhere. After the discussion he remarked that he did not wish to express any disbelief in big aeroplanes as such.

Mr. Bairstow said that if it were possible to increase the size at less than the rate of the cube of the dimensions, then we could certainly do better with big machines.

Capt. Barnwell, R.F.C., said that there remained the ability of improving the structure. As big machines cannot be "chucked

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about" by the pilot, they therefore do not need such a big factor of safety. All theoretical curves are based on model experiments with small wings at low speeds, and so go very far wrong at high speeds. At present the most important quality in a war machine is manœuvrability, so that the big machine is out of court. The best fighting machines are composed of the largest and lightest possible engine with the smallest possible fringe of aeroplane round it. He personally preferred the small fast machine to anything else, though this was probably due to a mere human desire to "hot-stuff" another machine. Capt. Barnwell intimated that he might quote many figures on this point, but it was probably inadvisable to do so in public.

Apropos which Professor Lanchester remarked that he had heard it said that the Defence of the Realm Act permits anyone to tell falsehoods in public without fear of contradiction, and prevents anyone else from telling the truth without fear of finding himself in jail.

Capt. Farren, R.F.C., advocated rapidity of manœuvre in aeroplanes.

Mr. Holt Thomas disagreed with Mr. Page on sundry points. He said that the big machines had great use at sea, but for military purposes he thought it was better to cut up the load among a number of machines. Judging from the photographs shown by Mr. Page, big machines appeared to need big handling parties on the ground.

Mr. Page interpolated the remark that the number of men seen in the photograph was accounted for by the desire of all hands not to be missed by the camera.

Mr. Howard Flanders said that when the weight per h.p. of a machine was increased, the climb seemed to fall off disproportionately.

Wing-Commander Longmore, R.N., said that there was plenty of room in the sky for all types, and that aeroplanes, like ships, could be classed as destroyers (scouts), light cruisers (1½ strutters), cruisers (ordinary two-seaters), and battle-ships (big aeroplanes). As in warships, armament must increase in power with the size of the machine. A few extra machine-guns with only the same range as those carried by "destroyers" were not enough. He thought that big machines were unduly vulnerable owing to the tanks and engines being so spread out. It might be better to centralise the power-plant and armour it. He thought that some day the engine firms might make the power-plant complete, like the chassis of a motor car, and then send it to the aeroplane people to have its wings fitted, just as a car is sent to a body-maker. He agreed that the Navy needed big sea-going aeroplanes.

Capt. Green, R.F.C., T.F. (late R.A.F.), claimed to have designed aeroplanes, and said that he had found that the weight increased unduly with the surface.

Mr. Gordon England agreed that large machines were clumsy. When testing a big machine he felt at the mercy of everything in the air, and that any moderate pilot, on a decent aeroplane, could have brought him down.

Mr. Sigrist thought that the large aeroplane "has to ask for permission of the little chap to go into the air." The mastery of the air depends on small machines.

Mr. Page said that economy of material accounts for the success of the big aeroplane, and that if properly armed a big machine can blow a small one to pieces without being touched.

Lieut.-Col. Mervyn O'Gorman, R.F.C., T.F., proposed a vote of thanks to Professor Lanchester.

SOME POINTS IN AIRSHIP ENGINEERING.

BY E. T. WILLOWS.

The construction of the rigid type airship is somewhat analogous to the building of a steel ship. It is built up of a number of ribs, usually referred to as transverse members, constructed on the box-girder principle.

In place of the longitudinal "stringers" which shape the hull of a sea-going ship, there are longitudinal members of similar type to the transverse, connecting the latter together, and the outside is covered with a cotton fabric waterproofed and fireproofed, laced in sections, so as to present a taut surface to the air.

After the transverse and longitudinal members are joined together in sections, they are braced by diagonal wires, and at the divisions formed by the separate gas bags there is a system of wiring similar to the spokes of a wheel, which, again, are wired round at different radii, giving the whole the appearance of a spider's web.

The inner and outer members of the girders in the large ships are spaced about 1 ft. apart, so that when the gas bags are full and bearing against this inner member and the wire bracing, there is a space left between them and the outer cover, which makes it more difficult to pass an incendiary body through to ignite the hydrogen gas.

In the ordinary way this layer of air is useful in acting as an insulator in keeping the temperature of the gas more constant. This is one of the great difficulties of the non-rigid system, as in this case, owing to there being only the one layer of fabric separating the gas from the outside air, any external increase or decrease of temperature is immediately transmitted to the gas, which is at once affected by expansion or contraction.

Gas-Containers.

The compartments formed by the transverse girders, which are "spoked," contain a cheese-shaped gas-container made of rubberised cotton. These are usually referred to in rigid ships as "ballonets," but must not be confused with the ballonets in the non-rigid system of constructing airships, as in the latter case they contain air, so that when the gas expands air is forced out, and no gas is lost until all the air in these air ballonets is expressed—or squeezed out.

The number of the gas compartments has hitherto been 17 in the older German ships.

To prevent the gas-containers from chafing against the wire bracing and girders, a light cord netting is stretched over the bags and secured to the girders, which netting also helps to distribute the lift of the gas over the top portion of the hull.

Each of these gas-containers is fitted with a valve at the top, which opens automatically when the bag expands to its maximum. This is accomplished by the attachment of the valve line to the lower part of the envelope in such a way that its length can be adjusted to open the valve at a given height.

The valve-line can also be operated by hand if necessary, the controls for the various gas bags being brought down, some to the front gondola, and the remainder to the after one.

The inspection of these gas bags, with their various attachments, is made possible by a gangway, or keel, running about two-thirds the length of the lower part of the envelope, to which keel there is access from the gondolas. An alternative system which is used in some Zeppelins is to have this gangway on the inner side of the hull itself.

It will, no doubt, ere long be possible to arrange that the power plant on these big ships shall be practically free from the danger of setting fire to any combustible mixture of gas or petrol vapour which may accumulate. However, there will always be a danger as long as hydrogen is used, and every precaution is naturally taken to ensure that if leakages should occur the gas can escape to parts of the hull where there is no danger of its being ignited.

From the gangway or keel access may be had to each gas-bag compartment, so that when they are slack, at the lower altitudes, they can be inspected for a considerable area, and by means of inspection-glasses let into the fabric the interior can also be well inspected, as well as the valve and valve-cords.

Should there be a small hole or rent, it can be located through the inspection-glasses, as it will show up against the rest of the fabric as a light spot. One of the crew can then locate this upon the outer surface of the gas bag by climbing along the girders and the hole can be patched as required. In this way damage to the airship by shrapnel pieces or bullets can, in the course of the voyage, be remedied. In the case of small holes or rents it is surprising what a comparatively small amount of gas escapes.

The gas bags are usually made of a two-ply cotton fabric, made hydrogen-proof with rubber and vulcanised. The two plies are at 45 deg. to one another. Although this does not give the strength that it would have if the two layers were parallel, the fact of their being vulcanised together diagonally gives a greater resistance to tearing, as in the event of a rent occurring the fabric has not the tendency to continue tearing that it would have in the case of the fabrics being superimposed with the weft and warp in the same direction, or in using a single fabric equal to the strength of the two layers.

The outer covering does not, of course, need to be hydrogen-proof, and need not be two-ply. It is made water and airproof and arranged so that it can be laced tightly in sections over the hull framework. When it is necessary to make a detail inspection of any gas bag, that particular section can be removed and the fabric of the gas-containers easily looked over from ladders or the sides of the airship dock.

When airships are built in such sizes that the present day "rigids" appear small or medium size craft, which is more than probable in the near future, it may be possible to utilise a very finely rolled sheet metal for the exterior covering. This will overcome easily one of the present difficulties in dealing with the question of fire prevention.

Gas Expansions.

Before leaving this matter of the gas bags, it would be as well perhaps to make it clear why it is necessary to allow for such an amount of expansion of the gas. This is due to the decrease of atmospheric pressure as the height from the earth's surface becomes greater.

The earth is surrounded by a layer of air some miles in height, and, consequently, every point upon the earth's surface has to support a column of air. Few people seem to realise that air

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has weight. The human system is built to withstand the pressure of the air in which we move, so we do not feel it. The average pressure at sea level on every square inch of surface is 15 lbs., due to the weight of the column of air above it. This weight, and, consequently, the pressure, becomes less as the height from the earth becomes greater, therefore, when a balloon is filled at sea level, the gas has to displace air at a pressure of 15 lbs. per square inch, so that the bag which holds the gas is subjected to a pressure of 15 lbs. per square inch, which it merely transmits to the gas inside.

As the balloon rises and the air pressure on its surface becomes less the gas immediately expands and reaches a point at which, if the balloon starts in a flabby condition, the bag becomes full. Under these conditions the airship must limit its altitude to the point at which its envelopes, or ballonets as they are more commonly called in rigids, become full, otherwise there would be a loss of gas taking place through the automatic valves releasing the interior pressure, which would otherwise eventually reach a point at which the "bags" would be in danger of bursting.

AIRSHIP CONTROLS.

The difficulty of obtaining stability is one little realised by the average reader. A nice cigar-shaped body would seem to the man-in-the-street to be just the shape to maintain a steady course when driven through the air, but somehow it seems to prefer to "yaw" to one side or the other from its true course, and when once this is started it develops a strong tendency to take charge and career along broadside on.

Here is a similar proposition to that of a boat, which is aptly illustrated by the difference in propelling a small skiff with no keel, or one that is flat-bottomed, as against a rowing boat which has a small vertical surface in the form of a keel. In a somewhat similar way flat surfaces, called planes or fins, are attached to the hull of the airship as far back as it is possible to place them, two being placed top and bottom in a vertical position, and one on either side in the horizontal.

There are now single surfaces in the large Zeppelins, and a flap or rudder is attached to each, the vertical ones acting as rudders, and those at the extremities of the horizontal fins are for the purpose of depressing the stern of the airship for ascending or raising the stern to enable the nose of the ship to be pointed down for descending

In the earlier types of Zeppelins superimposed surfaces were placed on either side of the bows for the purposes of ascending or descending. At moderate speeds surfaces placed on the bows had greater effect, and operated more quickly than those placed on the stern, but as the speed of the airships increased it was found that by depressing and lifting the stern the requisite amount of control necessary for efficient handling has been obtained. Single surfaces for the directional control in both planes seem now to be standard for all types of airships. This form, of course, enables stability to be obtained with less resistance than superimposed planes with their attendant struts and cross-bracing. The use of single surfaces for rudder and elevators also simplifies control.

PROPULSION METHODS.

Until recently, the Zeppelin designers have placed their propellers, by means of outriggers, on the sides of the hull, and driven them, from the gondolas suspended beneath, by a long shaft and bevel gears. More recently, they appear to have merged part of the system of the Schütte-Lanz, the German wooden example of rigid construction, into their design.

That is, they have retained one set of propellers attached to the sides of the hull, and have placed engines driving a propeller at the stern of the gondola through a reduction gear as in the Schütte-Lanz type.

The original Schütte-Lanz had three gondolas, each containing one engine driving a single propeller. The super-Zeppelins now have a stream-line body, again like the Schütte-Lanz, one large gondola forward containing the navigating controls and switchboards for the bomb-releasing gear, and one engine with its propeller at the after end of the gondola. Then are then two gondolas amidships, suspended one on either side of the hull, and each containing one engine driving a propeller as in the forward gondola. The aft gondola is placed in the centre line and contains three engines, two driving the side propellers through shafting, and the third at the stern of this gondola. This arrangement enables the total horse-power to be split up into six separate units, four of these having transmission of the simplest character, so that this should make for great reliability, and as long as there is fuel on board the ship should always be under control, and be able to return to its base.

From the forr'ard gondola, which is more roomy than the others, the ship is controlled. The commander has the steering-wheel in front of him, and a wheel at his side for controlling the elevators. Overhead are wire controls for opening gas valves, and also for opening the valves of the water-ballast bags. He also has at hand a switchboard controlling electrically the gear for releasing bombs.

In a central passage way, or interior keel, in the hull, provision is made for the storage of bombs, petrol tanks, and water-ballast. These weights are evenly distributed along the hull. From this passage way there is a tube passing through the hull to the machine-gun platform on the top, also smaller tubes which serve as ventilation shafts for this passage way.

At the after end of the passage way there is communication to a gun platform placed just behind the top rudder. The modern Zeppelin is plentifully supplied with light armament, as in addition to three machine-guns on top there are six or seven distributed among the gondolas.

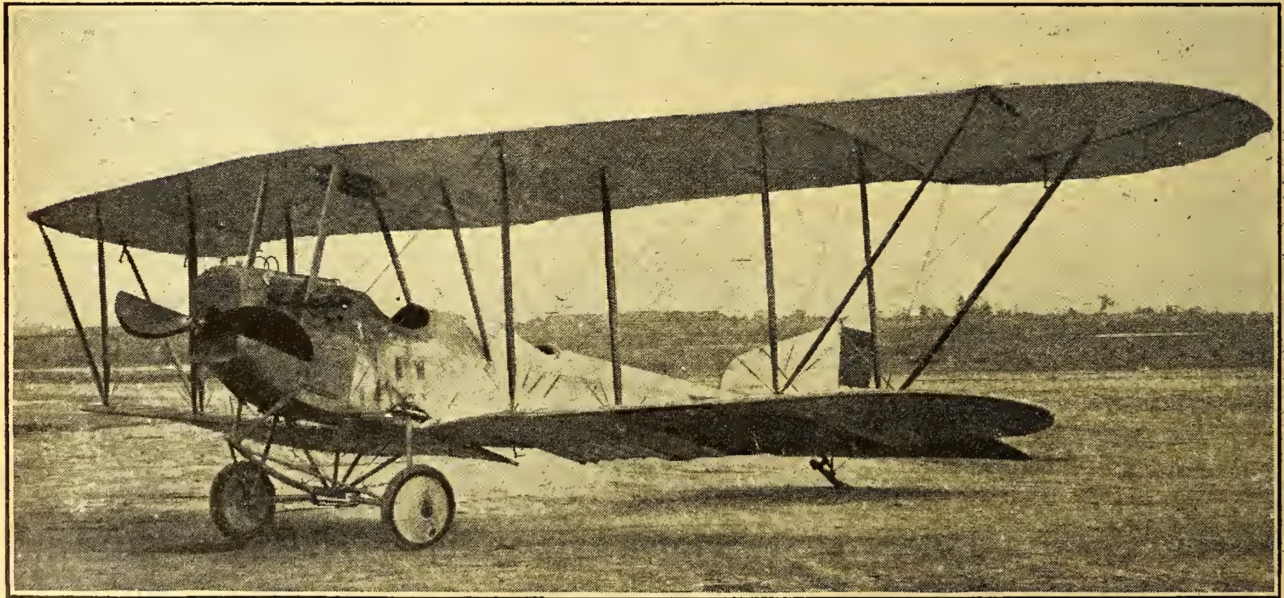
These ships do not yet appear to have reached a sufficient size to have provision made for carrying any bullet-proof protection for the gondolas.

The wireless apparatus is placed in the front gondola just behind the control station. Every provision is apparently made for the efficient working of this, as each engine is provided with a dynamo, belt-driven with a fast and loose pulley.

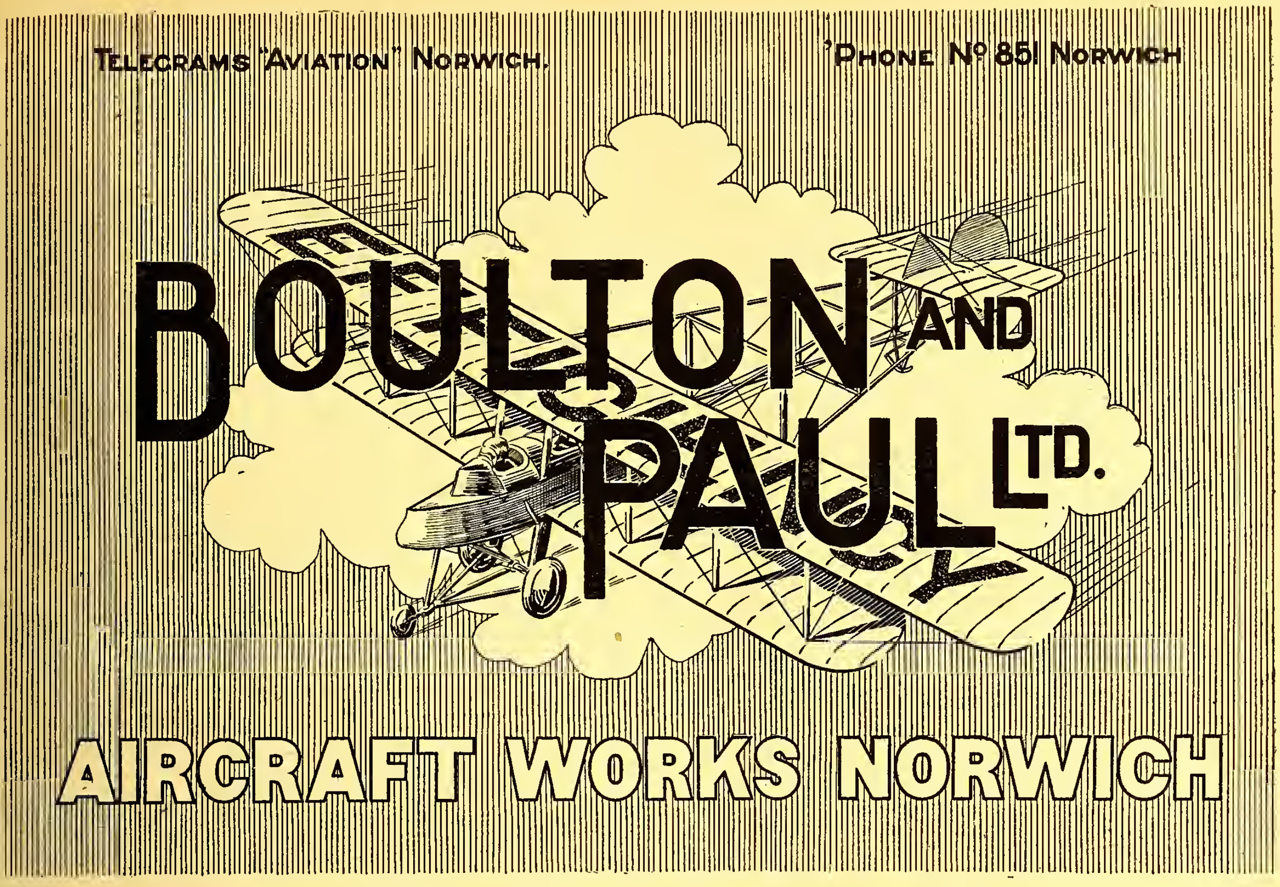
One of the most important departures and improvements in the new Zeppelin design is the wire cable running right through the centre of the hull, and joining up all the wire bracing between the ballonets.

By this means also the ballonets are kept in their places, as at the point at which the cable passes through the wall of the gas bag there is a gas-tight washer threaded on to a rod, so that should one ballonet become deflated, those on either side are to some extent prevented from tending to bulge into the empty compartment.

The impression one gets when seeing the latest design is that a fine passenger ship could be made of this type. With the displacement up to 50 tons, and the motive power divided into a half-dozen units, one sees in the present Zeppelin the forerunner of the fast round-the-world airships of the future.



AN EXPERIMENTAL SPANISH BIPLANE, officially known as the "W" type, obviously showing German influence in design, but with an interesting under-carriage.



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Some Points on Standardisation.

[The question of standardisation in aircraft is already occupying attention in America, though almost entirely neglected in this country, despite warnings two years or so ago in this paper. Such standardisation as has taken place has come about more by accident than by design, and the whole subject should be taken up by the S.B.A.C. and the Air Board.

The following notes from American "Aviation" will indicate what is being done.—Ed.]

At the annual meeting on Jan. 11th of the Society of Automotive Engineers, the Standard Committee's report was presented. This read as follows :—

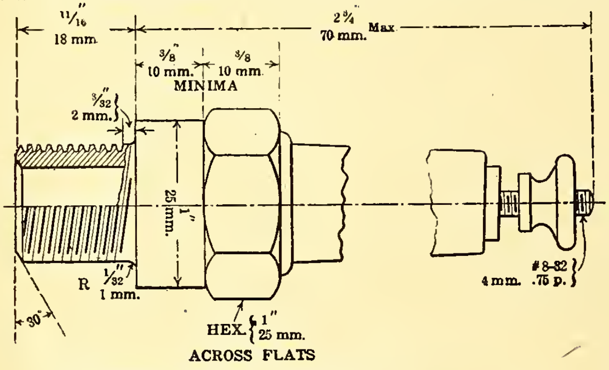
Spark Plug Size.

At the October meeting of the Standards Committee this Division reported in favour of recommending spark plugs having 18 mm. threads for use with aeronautic engines. This report was approved by the Standards Committee, but was referred back to the Division by the Council, asking for more complete detail dimensions.

Accordingly the Division has prepared dimensions as shown on the sketch presented herewith. The thread dimensions correspond with those adopted in Great Britain by the Engineering Standards Committee. No limits have been placed on the pitch diameter of the thread by the Engineering Standards Committee.

Considerable discussion developed on the question of whether metric or English dimensions should be used. In spite of a vote in favour of metric dimensions at the October meeting of the Division, several of the members were reluctant to adopt them. It was thought that the question was one of too great importance to be decided out of hand in a Division meeting, and that it should be discussed and decided by the Standards Committee or the Council, or both.

In order that the proposed standard for spark plugs might be placed on record, dimensions in both millimetres and inches have been provided, the closeness of the equivalents being determined by the degree of accuracy required in the different dimensions.



16.9 Threads per inch : 1.5 millimeters pitch
Root diameter 633 inch : 16.09 millimeters
Pitch diameter 678± inch : 17.22± 02 millimeters
Outside diameter 717 inch : 18.2 millimeters

Standard S.A.E. Spark Plug.

The design follows the same general lines as the S.A.E. large hexagonal plug, but the gasket seat and size of hexagon are 25 millimetres (approximately 1 inch) instead of 1 1-8 inches, this giving an ample gasket seat in connection with the 18 millimetres thread.

In addition to the dimensions given in the present S.A.E. standard for spark plug with 7-8 in. thread, a limiting dimension has been placed on the height of the plug above the gasket seat, and a definite dimension has been given from the gasket seat to the lower end of the spark plug shell.

In connection with the proposed spark plug standard, the Division recommends that in every case the tapped hole into which the spark plug is screwed should be counterbored slightly to approximately the outside diameter of the thread.

Engine Supports.

The Division recommends three sets of dimensions for bed timbers for supporting engines and aeroplanes. No standardisation is thought possible in regard to fore and aft length. The dimensions recommended are as follows in inches :—

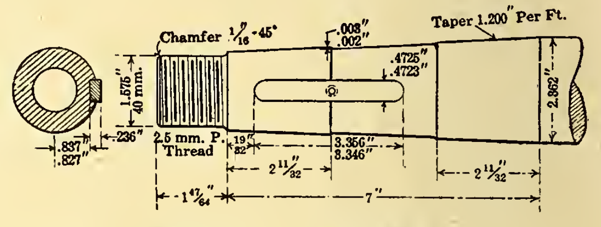
Distance between timbers	12 ...	14 ...	16
Width of bed timbers	1-½ ...	1-¾ ...	2
Distance between centres of bolts	13-½ ...	15-¾ ...	18

[The obvious reason for this is the facility it affords to designers of fuselages, in which longitudinal dimensions can be varied much more easily than transverse dimensions. At the same time it ought to be possible to standardise the longitudinal positions of holding-down bolts, for the engine designer would still be able to play with space fore and aft of them. This standardisation was strongly advocated in The Aeroplane two years ago.—Ed.]

Propeller Hub Dimensions.

At the October meeting of the Standards Committee, the Division proposed for acceptance a tapered shaft end for mounting propeller hubs, but this proposal was not voted upon. Since that time additional reports have been received from France and from New Mexico, to the effect that the tapered and keyed fitting for propeller hubs is giving perfect satisfaction.

The Division therefore submits for adoption as recommended practice, practically the same dimensoins as were submitted at the October meeting, the only difference being that the proportion of the tapered length to be relieved has been reduced somewhat. The proposal is outlined in the sketch presented herewith. Most of the dimensions are given in the English equivalents of the metric dimensions used in France, but may be translated back to metric dimensions if this policy shall be preferred.



STANDARD S. A. E. PROPELLER HUB

The Division is not prepared yet to recommend dimensions for hub flanges, etc., but the Aviation Section of the Signal Corps will submit drawings suggesting different sizes of hubs.

Direction of Engine Rotation.

At the October meeting of the Standards Committee the Division reported definitions of terms for direction of engine rotation. The National Advisory Committee for Aeronautics did not concur in these definitions in its report on nomenclature, and since printing that report has revised its own first definitions.

Because of lack of agreement with the National Advisory Committee, the Council of the Society referred the definitions back to the Division. The Division has reconsidered the matter, and is not thoroughly satisfied with any of the definitions proposed. It has accordingly prepared new definitions for direction of engine rotation, making use of the terms "normal" and "anti-normal" in place of the terms which have formerly been used and have caused confusion, are not to be reported to the Society at the present time, but are to be submitted to the National Advisory Board in order to secure agreement if possible before further definite action is taken.

AN AIRCRAFT FESTIVITY.

The Navarro Company, Ltd., of Burton-on-Trent, held their first social function on Feb. 1st.

The programme arranged was an extremely original one, and the whole entertainment proved a great success. Among other instructive and amusing performances was a juggling display by Mr. Dan Hurd, who balanced a 20 ft. by 12 in. baulk on his chin, at the same time juggling with a teapot and a bag of shavings. Another member of the staff, something of an artist, did some lightning sketches of Zeppelins and aeroplanes in colours with a whitewash brush.

Mr. Navarro, piloted by Mr. Nichols, gave an exhibition of short flights, looping the loop sideways, bomb-dropping (sawdust bombs), finishing with a sensational dive.

Mr. Ivel sang a pathetic song entitled "File me to sleep." The storekeeper enraptured the audience with selections on the triangle, including "Faust" in Asia Minor and other blood-curdling ditties. Various games were indulged in by the company at large.

The great feature of the evening was an Assault-at-Arms between the Drawing Office and the General Office, the weapons used being set-squares, T-squares, pens, and ink-pots.

Miss Wright brought down the house by playing the "Dead March" on her typewriter, with killing results to the machine, watched with anxiety by Mr. Navarro and Mr. Nichols. As it was impossible for a representative of The Aeroplane to be present, it cannot be guaranteed that all these features came off, but anyhow the programme says so. From every point of view the whole function was a success from start to finish, and judging from the reports in the local newspapers, the staff and employees welcomed the opportunity to demonstrate their goodwill for Mr. Navarro and his co-directors.

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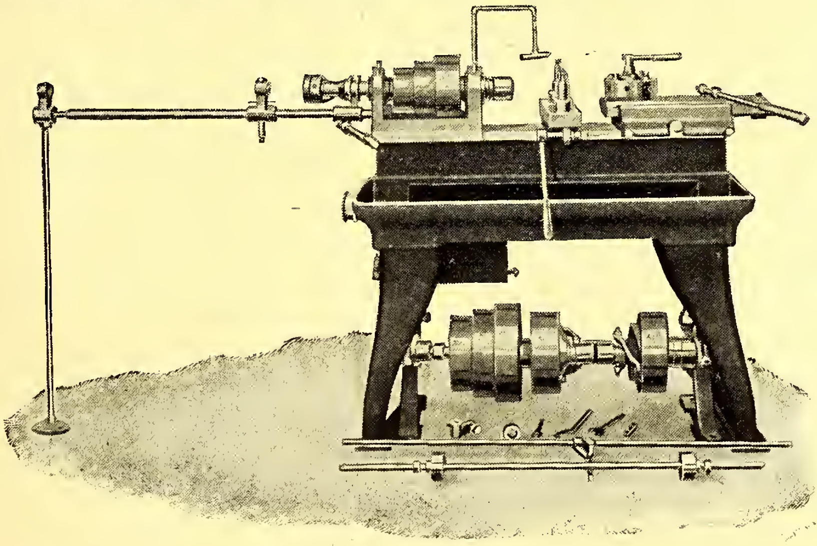

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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

Inconsiderate War.

War has a way of taking time, not by the forelock, but by the scruff and the seat of the toga, and flinging events into the middle of the year after next; scythe, hour-glass and all other loose kit being simply dropped into the nearest shell-hole. Now some of us who scrape bare sustenance out of carefully mixed soothsaying, long before the war risked all on our prophecy of the need and development of the big aeroplane, and, of course, the big motor to match. It always sounds wise and very difficult, at breakfast-time to-day to prophesy the arrival of dinner-time to-morrow; and when you know the cook, you can be very circumstantial. Which is the whole art and mystery of prophecy.

But when war blows in by way of a surprise party, the new arrival justifies the prophecy right enough: only you are certain to be caught short of provender, even with the best of cooks. Especially when you have the worst of housekeepers on an indefinite agreement, as we had in regard to Service aviation.

We were skimped and starved. Even Mr. Hubbard of the Aeronautical Society could discover no bone for us poor dogs of the craft. It is true that all sorts of wondrous *plats* of power had been proposed by various clever engineer-cooks; but they only existed in blue-print form. You cannot eat paper, and it has few other uses, even upon the famous list of Panurge.

Right up to the middle of 1916, too, we had no Inventions Bureau—not that it is of much use now we have it—and no Air Board to encourage and hurry development. Only an administration that insisted upon seeing—before they would even begin to talk business—ranks of motors that in the ordinary way would be worth anything up to £1,000 or so at works' cost, built in anticipation; huge works, the marriage certificate of the manager, and about three bankers' guarantees for delivery. So development sort of paused, to say nothing of output. For which output, nevertheless, G.O.Cs. were screaming in every Allied language, since we were supposed to be supplying and distributing these things all round.

Now that we have an Air Board, made up of real live men, not mandarins or mummies, we shall hope to get on better, and perhaps finish the war and clean up generally one of these days.

Such, hitherto, has been the position of the V-type motor; the type which at least is the most visibly ready to hand, with the most probable promise of big power. Had it been freely ordered from the outset, and thus concentrated upon by all specialist-designers, upon the reasonable prospect of contracts *if* the goods were good enough, it is more than likely that power capacity would have even developed ahead of requirements.

The Needs: and Some Hopes.

As it is, the truth is that it is actually anything from 50 h.p. to 100 h.p. short of actual present needs, at, say, 250-300 h.p. Whereas to-day we could do very well with an assured 400 h.p. from half-a-dozen supply sources. And the need of the first six months after the war, when we begin to see about aerial mails, coast patrols, international air-police, and things like that—which demand aeroplanes big enough to carry not only a crew, but a useful dead-weight of at least twice their live one—will be anything from 600 to 1,000 h.p.

So we have clearly got to hurry. I like prophecy, as it is the most interesting part of my trade. But I am so much fonder of the tangible fact that I could never write a prospectus. And, frankly, I don't see that 1,000 h.p. coming across the blue ranges anywhere in i.c. motor practice.

There is just one hope. Which is this. That the bigger the machine, the less you have to keep your power-plant in one pocket and your petrol in the other. Otherwise put, you can scheme confidently to do all sorts of things that would be out of the question even in the average two or three-seater of to-day. Because the factor of such things as fuel-bulk and bunker-space generally, does not always increase in proportion. Nor, necessarily, the power-plant bulk. Thus the use of that magnificent fluid-pressure medium, white-hot steam from a flash generator becomes a very practical possibility in a really big machine. And therewith an easy 750 h.p.

Likewise Possibilities.

As I happened to point this out six years ago in as many directions as I could, I may the more confidently lean on the subsequent agreement with that idea, of so eminent an authority as Mr. Grover C. Loening of the U.S.A.

His book illustrates incidentally, a very indifferent type of flash-boiler. Now few people know much about this kind of power outfit. But I have personally seen a Czerbulewitz flash-generator give the equivalent of 1,000 h.p. from a cuboid bulk of five feet by three and a half. Which would not be enormous in proportion to a really big machine; in fact, comparatively small. And steam-engines can be made in any handy design for compact "out-of-the-way" installation.

Furthermore, in a big outfit of the kind, the difficulty of keeping the burners alight and in full blast that was the bane of the steam-car, could readily be overcome. Burners of the size that would be used, could also use mazout or even gas-works oil at threepence a gallon, c.i.f.

And the best of the proposition would be that, except in the engine—and a "valveless" steam engine is not only a possibility, but would be in distinct demand for such a power-plant—high-precision engineering is not required. Any competent non-specialist works could build it.

Retrospect, Please.

But retrospect rather than prophecy for 19-and-something is my present task—[Glad you thought of it.—Ed.]—so to revert to the Vs and Y types. The future of the past two years' production, in one way, has been the manner in which the air-cooled eight-cylinder Renault was produced in various British editions; and how these faithful editions actually proved better—in one case by a whole 10 h.p.—than the original. I wish I were free to mention names in war-time.

The tragi-comedy, on the other hand, was the R.A.F. attempt to improve on that design, totally unfettered by the rudimentary consideration of knowing how. Or even beginning to know.

Concerning the Sunbeam

In another way, of course, the remarkable thing has been the production and development of the Sunbeam motor up to 225 h.p., as officially known. Not less remarkable was the way in which this motor was rushed into production without warning, and yet was none the worse, nor the less able to stop the gap of utter war urgency. Peerages have been won by less deservings.

This motor was the outcome, as usual, of the imaginative creation for the future, of the immediately unprofitable. For nobody at the moment—least of all the Admiralty that came begging for it in September, 1914—had any use for Mr. Louis Coatalen's 225-h.p. twelve-cylinder track racing motor of Brooklands fame.

Achievement: and Why.

It seemed, at the moment, to be about twice as powerful as even the most enterprising pilot-constructor thought he needed. Not that there was anything magical or marvellous about it, if

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only you could get a one-piece crank-shaft—just so much longer than a six-cylinder one, and stouter, as makes all the difference—to stand up to the work.

Which, simple as it sounds, is the vain and costly effort of about nine motor makers and fakers in ten: wherein Louis Coatalen nevertheless succeeded. Come to think of it, there seldom is any magic or marvel about such successes. Merely readiness ahead. William of Deloraine was merely a brawling Scottish freelance freebooting and reiving about on a Clydesdale garron. But he went down to the everlasting fame of ballad, because he was "good at need."

Motor-projects are easy, on paper. This motor was there, made, to be reached off the hook. So I am the freer to say that I do not love its design for a dozen sound reasons; all comprised in the not unreasonable reason that it is purely automobile, as anyone may see. Whereas an aero-motor should be at least marine-derived—if not an entirely original conception—with nothing automobile about it.

Still less, for all these reasons and others, do I like the latest—said to be hundreds more of horse' power—design that we are supposed to know nothing about on this side of the submarines. But the real point is that both kinds of Sunbeams do run excellently, and always have. Even R.N.A.S. scandalists praise them.

LIKEWISE THE EVER-GREEN.

The other most notable British development—at least that one may publish—is that of the Green six-cylinder 150-h.p. to its Y-type of 275 h.p. and twelve cylinders. It has been so fully described in these columns that there is no technical detail about it—as it is—unkenned, or to be discussed. Few, indeed, for any that might be.

It is possible, for instance, that it might be given some sort of beak-shaft coupling, for better propeller clearance than its compact crank-chamber perhaps affords at present. Or while about such a change, this might be combined with some reduction gear so as to enable the motor to be run at twice its present r.p.m., and thus to give—which seems well within the volumetric promise of its cylinders—450 or even 500 h.p.

This, however, is merely my opinion. For the rest—it being easier to follow the fortunes of a British motor anywhere else than under British Government auspices—I can only say that if the Green aero-motor is as well appreciated by our own Admiralty as it is in Russia and Italy to my knowledge. its merits will at long last have been recognised.

THE BIG SECRET.

No doubt all sorts of other developments of the V and Y-types may—at least can, for there is ample need for them—be happening in this country at the moment. We are not allowed to know, at least not until neutralities have published the news with broadcast inaccuracy. All I can say is that there exists at least one two-stroke actuality of over 300 h.p. out of four cylinders at 1,200 r.p.m.; which apt repetitions can convert any day into anything from 700 to 800 h.p. in eight or a dozen cylinders, of less dimensions, perhaps, but about the same r.p.m.

The crankshaft difficulty, at any rate, will be no hindrance; for the special design and working cycle of this motor is such that the said crank-shaft is actually floated between opposed explosion shocks and stresses, not alone in pairs or fours, but beneath every cylinder. And as incidentally, after fourteen years' effort in the two-stroke cycle, I reached my limit of balance in pairs, I bow my acknowledgments of defeat and all that there is most distinguished.

I may add that even in such a projected stride of power increase, the malign physical influences of lubrication and carburation would not occur either; all having been long since vanquished in the ampler cylinder dimensions of the existing example.

Here, again, Russian, Italian, and even American official appreciation has outrun our own; so far, in fact, that it might be prejudicial to mention names or identify what has already been available these twelve months. *Magna est veritas et*—which translates best into "No names no pack-drill: or fatigues." Let it nevertheless be said—if only as my opinion—that this is easily the greatest aeromotor development of the last ten years, let alone 1916.

THE GREAT AMERICANS.

Some considerable way behind—and still no less interesting—come those of the United States. In the largest powers, I unhesitatingly place the Duesenberg first in the water-cooled division, and the Kemp in the air-cooled, in theory, though Curtiss, Thomas, and Sturtevant have put up good performances in practice. For all the reasons in either case that I need not repeat, having so comparatively recently dealt with both in detail.

The Kemp's superiority in design, however, may be best summarised in its special forced-draft air-distribution; and the Duesenberg's in that pure outcome of gas-engine practice and efficiency of which the Lanchester and Delage Coupe de L'Auto-type motors are best-known examples in Europe.

To these principles and extremely simple mechanical practice, however, the Duesenberg added a singularly adequate modelling for the V-type; one that has so far not been merely approached for its grace and simplicity. It is, so to say, the severe classic beauty of Empire against the efflorescences of Louis Quatorze and all the pretty-pretty rubbish of the Trianon: Rodin against any Giovanni Qualicosi who prostitutes marble into point-lace.

One expects so much, indeed, from the greatest designer of racing marine motors in America. But I think even his design's efficiency—or that of its cycle—could be improved with a graft of Georges Ville's practice: which is really that of the Gnôme monosoupape adapted for exhaust instead of induction—with an addition.

(*To be continued.*)

New Patents.

This list is specially compiled for THE AEROPLANE by Messrs. Rayner and Co., Registered Patent Agents, of 5, Chancery Lane, London, from whom all information relating to Patents, Designs, Trade Marks, etc., can be obtained gratuitously.

LATEST PATENT APPLICATIONS.

1428. E. E. Brown. Aircraft. 29/1/17.
1615. R. Maguire. Aeroplanes. 1/2/17.
1430. Sopwith Aviation Co. Means for synchronising firing of gun with rotation of propeller upon aeroplanes. 29/1/17.

SPECIFICATIONS PUBLISHED THIS WEEK.

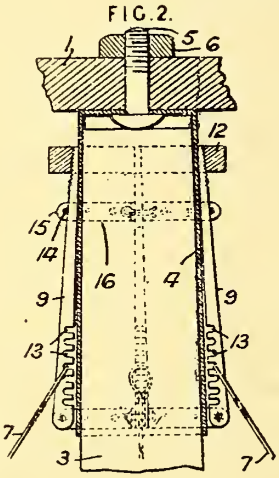
103,342. T. D. Kelly. Propeller-shafts.
103,400. A. A. Holle, A. W. Judge, and Varioplane Co. Planes and the like for aeroplanes.

LATEST PUBLISHED ABSTRACTS.

14,497. Aeronautics; wire-strainers. J. T. Havens. 605, Bauge Avenue, Ashbury Park, New Jersey, U.S.A.

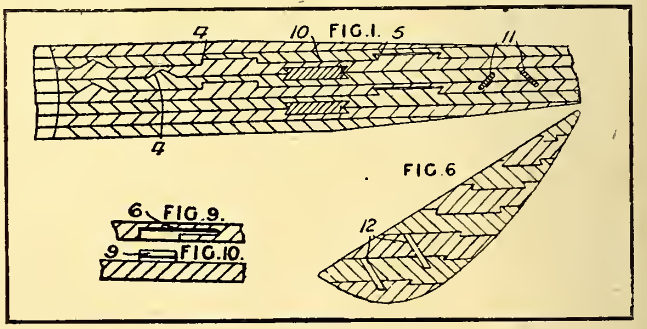
A device for quickly releasing or tightening the guy-wires of aeroplane wing structures comprises levers 9, which are pivoted to caps 4 on the struts 3, and are adapted to be turned back against the caps, and secured by nuts 12, or equivalent means. The levers 9 have each a series of notches 13 to take the looped end of the guy-wire 7, and allow of adjustment. To prevent the levers on a cap being all released when the nut is removed, the levers are additionally secured by pins 14 between lugs 15, on arc-shaped members 16, secured to the cap. The caps are secured to the planes 1 by studs 5 and nuts 6.

FIG. 2.



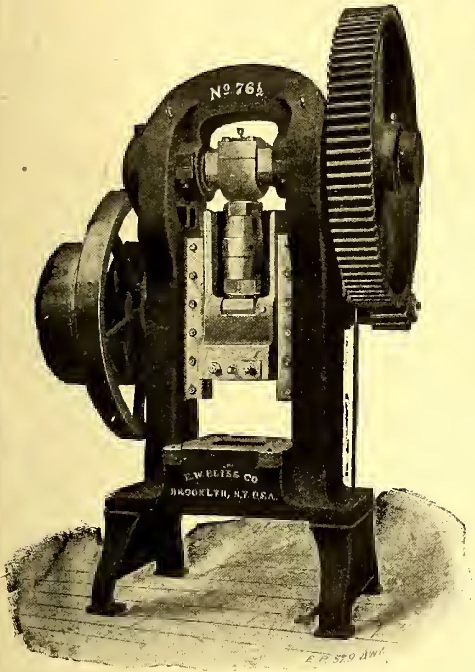
14,640. Screw Propellers. E. M. Knowles, 20, Humboldt Street, Bradford.

In order to increase the adhesive surface of the laminæ of wooden screw propellers for aircraft projections, ribs, or excrescences 4 are formed on one contiguous surface and engage with corresponding surfaces on the other contiguous surfaces.



The parts are also locked mechanically by dovetails 5 or 10, or keys 11, or pegs 12. A stud 9 on one surface may engage an undercut groove 6, Fig. 9, on an adjacent surface.

Printed copies of the published specifications and abstract can be obtained from Messrs. Rayner and Co., at the price of 1s. each.



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British & Colonial Aeroplane Co., Ltd. (The Bristol Co.), Filton, Bristol.
British Caudron Co., Ltd., Broadway, Cricklewood, N.
Curtiss Aeroplane Co., L. J. Seely, Clun House, Surrey St., Strand, W.C.
Davidson Aero Co., Ltd., Hammersmith, W.
Eastbourne Aviation Co., Ltd., Eastbourne
Grahame-White Co., Ltd., London Aerodrome
Handley Page, Ltd., 110, Cricklewood Lane, N.W.
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Mann, Egerton & Co., Aircraft Works, Norwich
Martinsyde, Ltd., Brooklands, Byfleet
National Aircraft Co.,Ltd. 15, Hackney Rd.N.E.
Norman-Thompson Flight Co., Ltd., Bognor
Roe, A. V., & Co., Ltd., Manchester
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Supermarine Aviation Co., Ltd., Southampton
Vickers, Ltd., Imperial Court, Basil Street, Knightsbridge, S.W.
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Dudbridge Iron Works, Ltd. (Salmson), 87 Victoria St., London, S.W.
Gnome Engine Co., 47, Victoria St., S.W.
Gordon Watney, Ltd., Messrs., Weybridge
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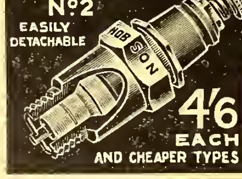

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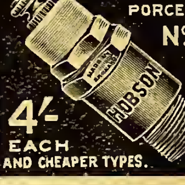

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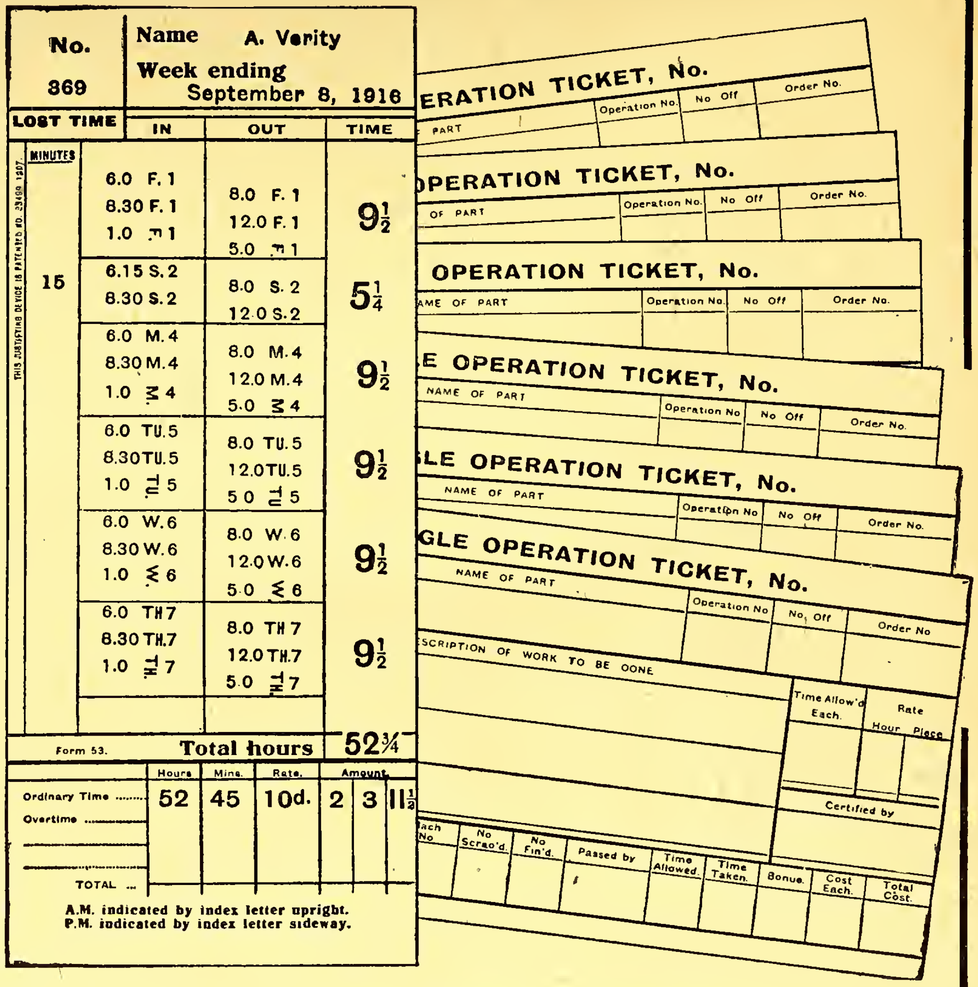

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	6.0 W.6 8.30 W.6 1.0 W.6	8.0 W.6 12.0 W.6 5.0 W.6	9½
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(*Continued from page* 440).

R.F.C.—Van der Spuy, Temp. Capt. K. R., M.C., Gen. List; Walmsley, Sec. Lt. (temp. Lt.) L., E. Yorks R.; McKiever, Sec. Lt. A. V., Sea. Highrs.; Collender, Temp. Sec. Lt. G. F. F., Gen. List.

Willis, No. Z2 Flt.-Sgt. H. L.; Duncan, No. Z42 Flt.-Sgt. (actg. Sgt.-Maj.) S. N.; Grant, No. Z185 Flt.-Sgt. D.; Rae, No. Z76 Sgt. R. M.; Reynolds, No. Z222 Sgt. A. E.; Hamblin, No. Z98 Cpl. A. A.; Mathieson, No. Z151 1st Cl. Air Mech. A. H.; Firth, No. Z225 1st Cl. Air Mech. T. (deceased).

* * *

From the "London Gazette," Feb. 9th, 1917.

Admiralty, Feb. 7th.

Flt. Sub-Lt. E. B. Gammon, who relinquished his commn. on account of ill-health contracted in the Service, to retain his rank.

War Office, Feb. 9th.

REGULAR FORCES. — Establishments. — R.F.C. — Adjt. Temp. Lt. J. G. Howell, M.C., R.A., Dec. 22nd, 1916.

Equipt. Officer, 2nd Cl.—Temp. Lt. G. M. Rogers, Gen. List, Jan. 1st.

Memorandum.—Co. Qrmr.-Sgt. J. E. Hall, from R. Highrs., T.F., to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Jan. 24th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Sec. Lt. S. Whitechurch to be Lt., Feb. 1st; Sec. Lt. (on prob.) J. C. Noble relinquishes his commn. on account of ill-health, Feb. 10th. The following Sec. Lts. (on prob.) are confirmed in their rank:—L. G. Fenner, A. B. Morgan, C. E. Fairburn, W. Sillem, C. L. Hardy, G. M. Watt, G. R. Kull. To be Sec. Lts. (on prob.):—A. S. Windsor, Jan. 20th; E. Dodson, Jan. 23rd; L. V. Rothschild, Jan. 30th; H. H. Hussey, Feb. 1st.

* * *

From the "London Gazette" Supplement, Feb. 10th, 1917.

War Office, Feb. 10th.

REGULAR FORCES.—The following Men to be temp. Sec. Lts.:—

Memoranda.—For duty with R.F.C.:—Pte. F. C. Gorringe, from Can. Infy., Pte. E. H. Jones, from Can. A.S.C., Jan. 16th.

R.F.C. — Establishments.—Flt. Comdr..—Temp. Lt. F. J. Roberts, Gen. List, from a Flying Officer, and to be temp. Capt. whilst so employed, Dec. 1st, 1916.

Flying Officers.—Sec. Lt. L. H. Hansen, Co. of Lond. Yeo., T.F., Jan. 5th. Temp. Sec. Lt. R. E. Bryson, attd. Sco. Rif., Jan. 6th. Sec. Lt. D. L. P. S. Stuart-Shepherd, E. Lan. R., from attd. Worc. R., and to be secd.; Sec. Lt. J. de Conway, Lovat's Scouts Yeo., T.F., Jan. 8th. Sec. Lt. H. Welch, R.F.A., T.F., from a Flying Officer (Observer), Jan. 11th, seny. from Feb. Feb. 12, 1916. Temp. Sec. Lt. M. B. Cole, Gen. List, Temp. Sec. Lt. W. A. McClatchie, Gen. List; Temp. Sec. Lt. (on prob.) A. W. Watson, Gen. List, Temp. Sec. Lt. (on prob.) R Applin, Gen. List; Temp. Sec. Lt. (on prob.) R. Clowes, Gen. List, Jan. 23rd. Temp. Sec. Lt J. F. Manning, attd. Middl'x R., Jan. 24th. Sec. Lt. H. Forrest, R.F.A., T.F., Sec. Lt. A. G. Jones-Williams, Welsh R., and to be secd., Jan. 25th.

Equipment Officer, 3rd Cl.—Sec. Lt. C. J. Brockbank, Gen. List, Jan. 8th. (Substituted for notification in 'Gazette" of Jan. 23rd).

Memorandum.—H. Izard (late Lt., E. Afr. Native Trans.) to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Jan. 12th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Sec. Lts. to be Lts.:—M. C. Evans, S. F. Vincent, J. A. Gibson, Jan. 1st.

Sec. Lt. M. V. Morgan relinquishes his commn. on account of ill-health, Feb. 11th.

TERRITORIAL FORCE.—R.F.A.—Sec. Lt. H. M. Coombs is seconded for duty with R.F.C., Jan. 25th.

Infantry.—Middlesex R.—Sec. Lt. G. H. Harrison is secd. for duty with the R.F.C., Jan. 23rd.

* * *

From the "London Gazette" Supplement, Feb. 12th, 1917.

War Office, Feb. 12th.

REGULAR FORCES.—Staff.—The following temp. appt. is made at the War Office:—Staff Lt.—Sec. Lt. (temp. Lt.) H. F. Anns, Lond. R., T.F., from an Equipment Officer, 2nd Cl., R.F.C., and to relinquish his temp. rank, Jan. 1st.

R.F.C.—Establishments.—Equipment Officers, 1st. Cl.—Lt. (temp. Capt.) J. B. Bowen, Pembroke Yeo., T.F., from the 2nd Cl., and to retain his temp. rank whilst so empld., Dec. 28th, 1916. 2nd Cl.—From the 3rd Cl.:—Sec. Lt. (temp. Lt.) G. I. N. Deane, Tyne Elec. Engrs., R.E., T.F., and to retain his temp. rank whilst so empld.; Lt. L. Findlater, M.C., Manch. R., S.R.; Sec. Lt. J. Brown, S.R., and to be temp. Lt. whilst so empld., Sept. 26th, 1916. 3rd Cl.—Sec. Lt. (on prob.) A. O. Roberts, S.R., Sept. 16th, 1916. Temp. Sec. Lt. W. C. Faull, Gen. List, Oct. 7th, 1916. Sec. Lt. G. R. Kull, S.R., Oct. 23rd, 1916. Temp. Sec. Lt. (on prob.) G. Lynch, Gen. List, Nov. 30th, 1916. Temp. Sec. Lt. (on prob.) P. S. Riach, Gen. List, Dec. 5th, 1916. Temp. Sec. Lt. (on prob.) C. H. Parker, Gen. List, Dec. 12th, 1916.

Infantry.—Welsh R.—Temp. Sec. Lt. F. V. Kilway, from Gen. List, R.F.C., to be temp. Sec. Lt., attd., Feb. 13th, but with seny. from July 7th, 1916.

TERRITORIAL FORCE.—Infantry.—London R.—Sec. Lt. G. R. G. Topham is seconded for duty with the R.F.C., Jan. 16th, 1917.

* * *

War Office, Feb. 12th.

The King has been pleased to award the Victoria Cross to:—

No. 1396 Sgt. Thomas Mottershead, late R.F.C.

For most conspicuous bravery, endurance, and skill when, attacked at an altitude of 9,000 feet, the petrol tank was pierced and the machine set on fire.

Enveloped in flames, which his observer, Lt. Gower was unable to subdue, this very gallant soldier succeeded in bringing his aeroplane back to our lines, and though he made a successful landing, the machine collapsed on touching the ground, pinning him beneath wreckage from which he was subsequently rescued.

Though suffering extreme torture from burns, Sgt. Mottershead showed the most conspicuous presence of mind in the careful selection of a landing-place, and his wonderful endurance and fortitude undoubtedly saved the life of his observer.

He has since succumbed to his injuries.

[The action recalls that very gallant performance by Lieut. Dyke Acland, R.F.C., who saved both his passenger and himself under precisely similar circumstances, and made a perfect landing. He received a minor Russian Order some time later. One is glad to see the late Sergeant Mottershead's gallantry rewarded so promptly, but one is inclined to wonder whether if he had lived he would have received the V.C., and have been allowed to draw the attendant pension.—Ed.]

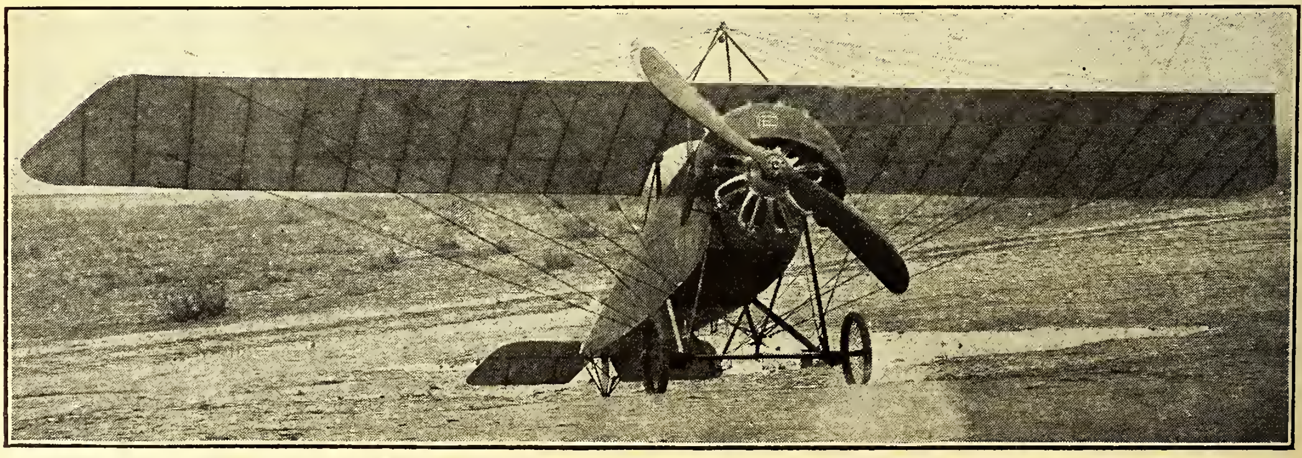
* * *

A special supplement of the "London Gazette," dated Feb. 11th, contains the following:—

The King has been graciously pleased to give orders for the following promotion in and appointment to the Most Honourable Order of the Bath in recognition of the services of the undermentioned gentlemen during the war:—

To be Ordinary Member of the Civil Division of the Third Class, or Companion, of the said Most Honourable Order.

Colonel John George, Duke of Atholl, M.V.O., D.S.O., Scottish Horse (Yeomanry).



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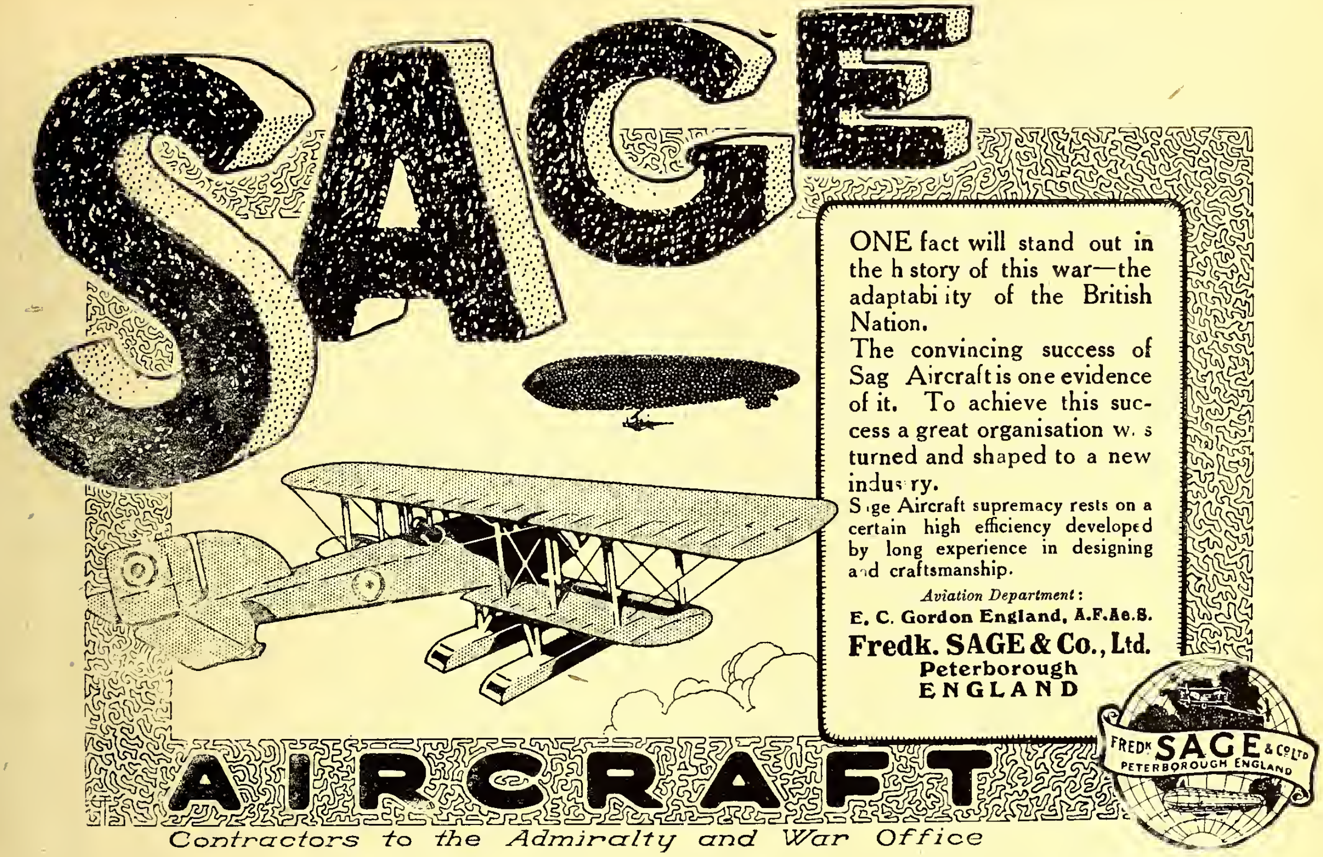

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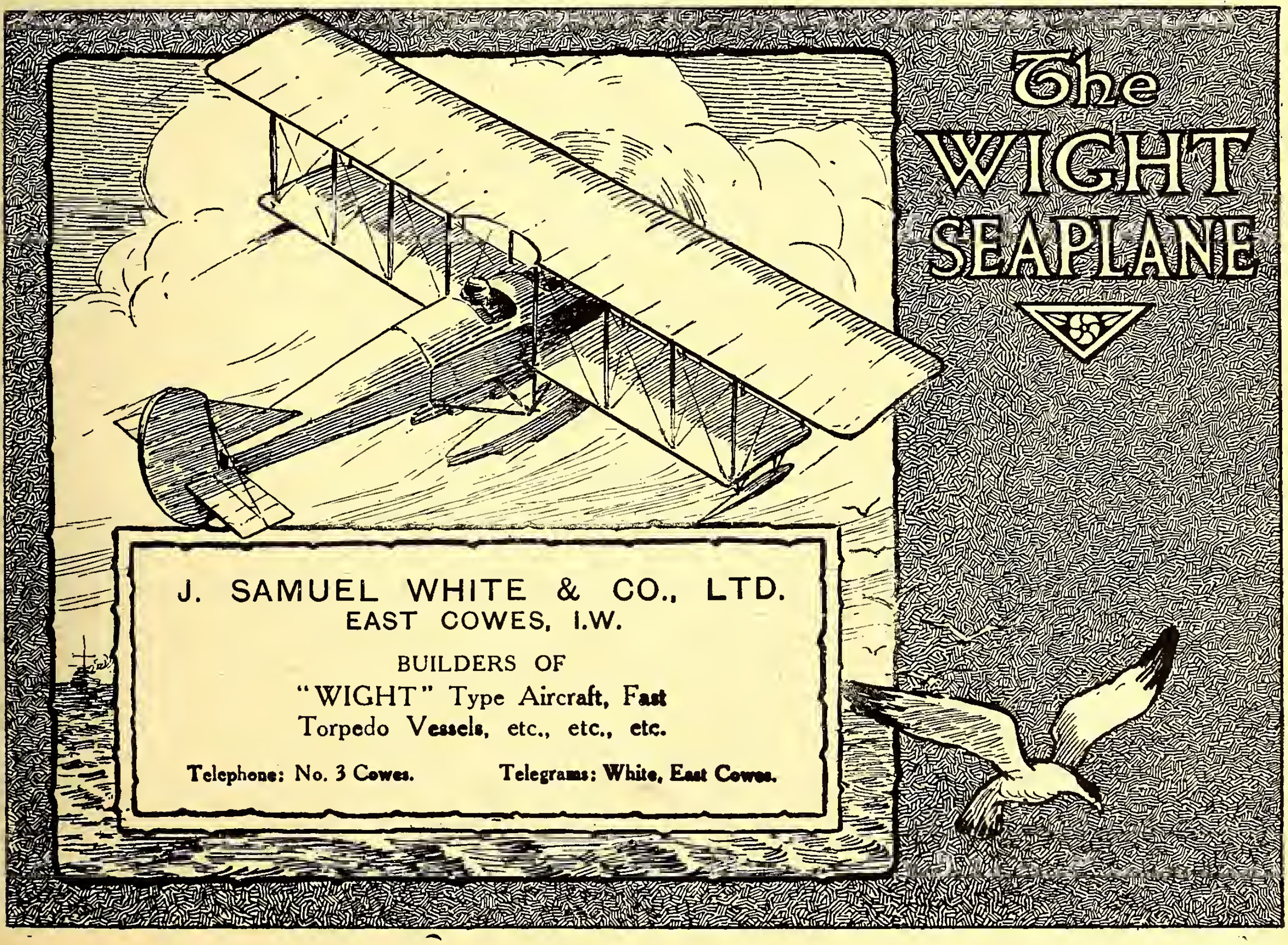

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His Majesty has been pleased to confer the honour of Knighthood upon W. Weir, Esq.

[Mr. William Weir, managing director of the Glasgow firm of G. and J. Weir, was, on account of his fine record of production against time, appointed by Mr. Lloyd George Director of Munitions Supplies in Scotland. His firm has produced many special forms of internal-combustion engines for war purposes. He has recently been appointed Controller of Aircraft Supplies, and is a member of the Air Board.—Ed.]

FROM THE COURT CIRCULAR.

Buckingham Palace, Feb. 10th.

The following Officer had the honour of being received by His Majesty, when the King invested him with the Insignia of Companion of the Order into which he had been admitted :—

The Distinguished Service Order.

Sec. Lt. George McCubbin, R.F.C.

His Majesty then conferred the decoration as follows :—

The Military Cross.

Capt. William Pender, R.F.C.

The King and Queen, with the Princess Mary, and attended by Commander Sir Charles Cust, Bt., R.N., visited the Royal Flying Corps Club, Bruton Street, this afternoon.

NAVAL.

The following appointments have been made in the Royal Naval Air Service :—

Feb. 7th.—Temp. commissions (R.N.V.R.) have been granted to the following, seny. Feb. 5th :—Lts.—G. W. Lester, W. T. Passmore, and A. A. Scott. Sub-Lts.—T. A. Ellis and A. D. Newbury.

Mr. E. D. Jones, entered as Wt. Officer (temp.), 2nd grade, seny. Feb. 12th.

Feb. 8th.—Flt. Lts.—L. H. F. Irving and G. H. Jackson, both apptd. Actg. Flt. Commrs., seny. Jan. 24th.

Flt. Lts. (temp.).—F. W. Merriam and C. E. Howard, both apptd. Actg. Flt. Commrs. (temp.), seny. Jan. 24th.

Flt. Sub-Lts. (temp.).—P. A. F. Bolton, apptd. Actg. Flt. Lt. (temp.), seny. Jan. 18th ; and A. W. Williams, apptd. Actg. Flt. Lt. (temp.), seny. Jan. 24th.

Mr. E. Sturman entered as Proby. Flt. Officer (temp.), seny. Feb. 11th.

Feb. 9th. Flt. Comdr.—R. H. Muloch, D.S.O., reapptd. Actg. sqdn. Comdr., seny. Feb. 6th.

Flt. Lts.—T. C. Vernon, B. C. Bell (temp.), H. S. Neville (temp.), and S. J. Goble, D.S.C. (temp.), all reapptd. Actg. Flt. Comdrs., seny. Feb. 6th.

Flt. Sub-Lts. (temp.)—L. Edwards and M. J. Golding, both reapptd. Actg. Flt. Lts., seny. respectively Dec. 24th and 28th.

Admiralty Communiqués.

Feb. 6th.—An attack on Bruges Harbour was carried out by naval aeroplanes on the 2nd inst.

Many heavy bombs were dropped on torpedo craft in the harbour, and buildings in the docks were set on fire.

The pilots experienced considerable difficulty owing to the intense cold.

Another successful bomb raid was carried out on the following night, and bombs were observed to fall on the docks and railway lines.

All pilots and machines returned safely.

Feb. 10th.—On the afternoon of the 9th inst. an attack was carried out by naval aeroplanes on the aerodrome of Ghistelles (south of Ostend). A large number of bombs were dropped which were observed to explode on the objective.

All pilots and machines returned safely.

The Casualty List.

Reported Feb. 7th.

Died of Injuries.—Dawes, W. D. S., Air Mech., 1st Grade, F.8938.

Reported Feb. 10th.

Missing, believed Prisoner.—Elliott, Flt. Sub-Lt. George L., R.N.

Missing.—Traynor, Flt. Sub-Lt. Walter E., R.N.

Slightly Injured.—Sieveking, Flt. Sub-Lt. Valentine E., R.N.

Previously reported Missing, now reported to have Died as Prisoner.—Hope, Flt. Sub-Lt. William H., R.N.

PERSONAL NOTICES.

Deaths.

HOPE.—Flt. Sub-Lt. W. H. Hope, R.N. reported missing on Nov. 23rd, 1916, and now reported to have died as a prisoner of war on the following day, was born in the Argentine and educated at Bedford Grammar School. He joined the R.N.A.S. in Sept., 1915, having previously served a year in the ranks of the Hampshire Carabiniers. He was the younger son of the late John Hoyhurst Hope, of Bedford, and previously of the Argentine, and of Mrs. Harriett Hope, of 10, Welbeck Court, Kensington, W.

LEGGE. —Walter Holden Legge, Sub-Lieut., R.N.V.R. and R.F.C., of Okanagan Lake, British Columbia, died on Feb. 11th of injuries received while flying in England. He was the fourth son of the late Henry Legge, of Stamford Hill, and brother of H. Bevington Legge, The Nest, Hayes, Kent. He was 34 years of age.

Engagements.

SAMSON—STOREY.—The engagement is announced of Wing-Commander Charles Rumney Samson, D.S.O., R.N., second son of Mr. and Mrs. Charles L. Samson, of 2, Montagu Square, W., to Honor, only daughter of Herbert L. Storey, Esq., J.P., D.L., of Bailrigg, Lancaster.

Commander Samson is known to all concerned with aeronautics as the senior of the first three Naval officers permitted officially by their Lordships of the Admiralty to learn to fly. He soon developed into a brilliant pilot, and though he has been flying for something like six years, his nerve and skill show no diminution, as is proved by the recent award to him of a bar to his D.S.O. for "gallantry as a flying officer."

He won his D.S.O. for gallantry in Flanders in the early part of the war. Later he took a squadron to Gallipoli, where his personal bravery and skill as a flier won high admiration. After a period of strenuous work there, he was invalided home, but later returned to the Near East, where he took command of the "Ben-my-Chree," which vessel was sunk recently in harbour by shell-fire from the mainland. During this last period he won the bar to his D.S.O., and it is jestingly averred that his activities caused a fresh outbreak of hostilities in an area in which the Turks and the Allies had come to the conclusion that war was not a pleasing pastime.

All the old hands in the Flying Services will rejoice to hear of Commander Samson's latest good fortune, and will wish him and his bride long life, the best of luck, and many further honours to come.

* * *

WATERLOW—CLARE. — An engagement in announced between Lieut.-Col. and Wing Commander Clive Waterlow, R.E. and R.N.A.S., only son of D. S. Waterlow, J.P., and Mrs. Waterlow, Cornwall Gardens, S.W., and Joan, younger daughter of Mr. and Mrs. Clare, of Farlands Croft, Farnham

Colonel Waterlow is one of the pioneers of British airships. He was one of the first officers to be concerned with the little Army Airships in the days of the Air Battalian R.E., and won a high reputation as an airship pilot. He transferred with his ships to the R.N.A.S., and has done distinguished service in his new capacity.

Marriages.

BRISLEY—DAWSON. — On Feb. 5th, Flight Commander Cuthbert Everard Brisley, R.N.A.S., son of the late G. C. Brisley, J.P., of The Pines, Umzimkulu, Natal, was married to Marjorie Beryl Dawson, daughter of the late Hamilton William Atherley and Mrs. Oakes, of Silverbeck, Stanwell, Middlesex.

* * *

CADBURY—PHILLIPS.—The marriage took place on Feb. 12th, at the parish church, Gorleston, of Flt. Lt. Egbert Cadbury, D.S.C., R.N., youngest son of Mr. and Mrs. George Cadbury, of Bournville, Birmingham, and Miss Mary Forbes Phillips, daughter of the Rev. A. Forbes Phillips and Mrs. Forbes Phillips, of Gorleston. The bride, who was given away by Commodore Astley Ellison, C.B., R.N., was attended by her sister, Miss Betty Forbes Phillips. Lt. G. H. S. Kerr, R.G.A., was best man, and the Rev. A. Forbes Phillips officiated

* * *

DE HOGHTON-MACDONALD.—The marriage took place on Feb. 12th, at St. Mary's, Cadogan Street, of Flt. Lt. Cuthbert De Hoghton, R.N., eldest surviving son of Sir James and Lady De Hoghton, of Hoghton Tower, Lancashire, and Miss Helen Macdonald, only daughter of the late Major Duncan Macdonald of Glencoe.

The bride was given away by her guardian, Mr. Hartford Platt. Miss Suzanne Platt acted as train-bearer, and there were also five bridesmaids—Miss Joan De Hoghton (sister of the bridegroom), Miss Cameron Head, Miss Eden Coghlan, Miss Mary Reade, and Miss Nesta Villiers Stuart. Flt. Lt. Villiers, R.N., was best man.

Birth.

FAWKES.—On Feb. 9th, at Walney Island, Lancashire, the wife of Surgeon Marmaduke Fawkes, M.B., R.N., attd. Naval Airship Section of R.N.A.S., of a daughter (Marguerite).

MILITARY.

G.H.Q. Communiqués.

Feb. 6th, 8.30 p.m.—Yesterday bombs were dropped by us on an enemy aerodrome, and considerable damage was seen to have been done.

Two of our aeroplanes were brought down in air fights, and two German machines were driven down damaged.

Feb. 7th, 9.15 p.m.—Bombing operations by our aeroplanes were continued yesterday with success.

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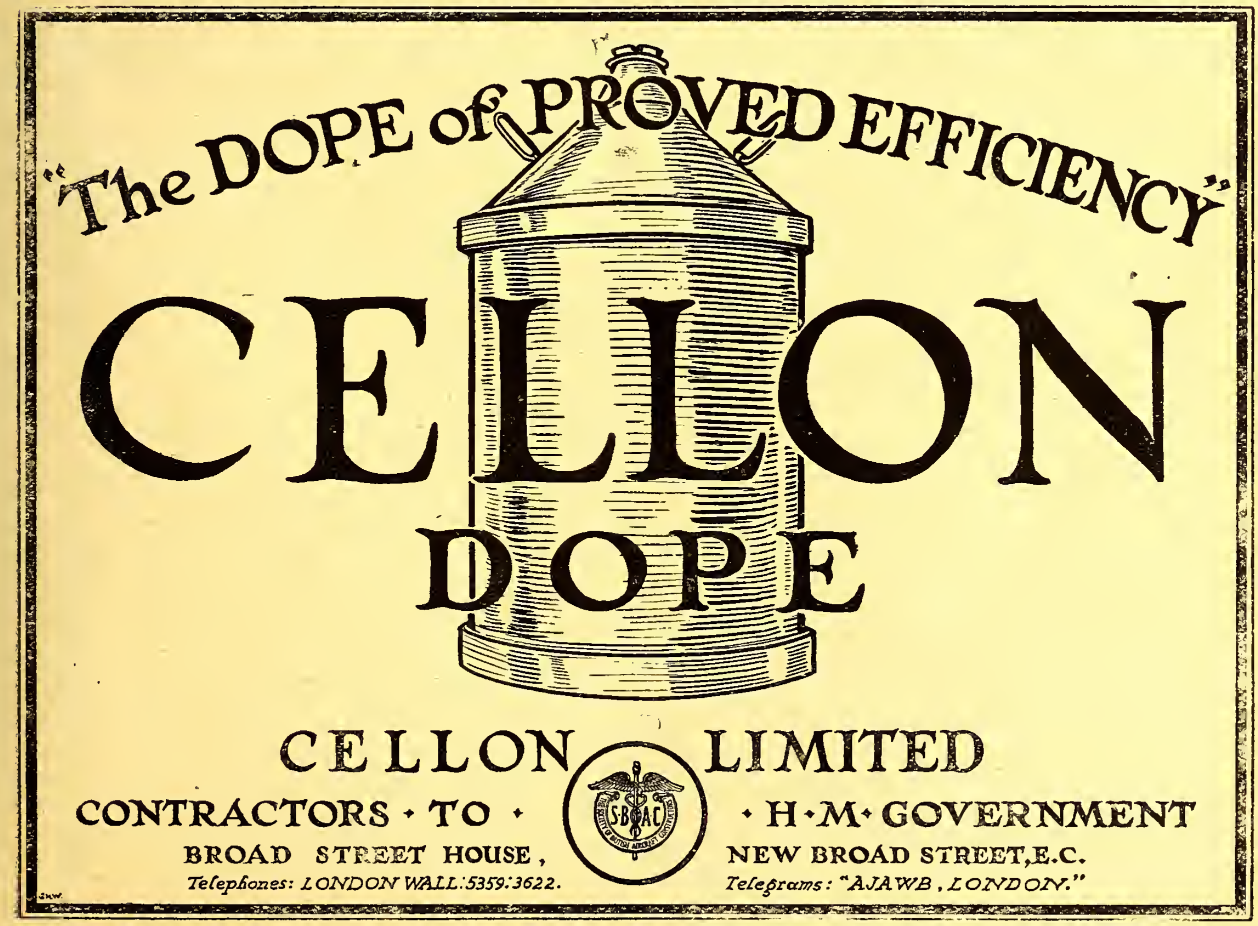

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Many fights took place in the air. Three German machines were driven down damaged. Two of our aeroplanes are missing.

Feb. 8th, 8.50 p.m.—On the night of the 6th-7th we dropped bombs on an enemy aerodrome with good effect.

One German aeroplane was destroyed yesterday in air fighting, and three others were driven down damaged. One of our machines is missing.

Feb. 10th.—Yesterday bombs were dropped by us on a number of places of military importance, and considerable damage was done to an enemy aerodrome.

One German aeroplane was destroyed in an air fight, and another hostile machine was brought down by our anti-aircraft guns.

Feb. 11th.—Bombing operations were carried out by our aeroplanes with good results on the night of the 9th-10th inst., and again yesterday. One German machine was driven down in air fighting.

Feb. 12th, 8.32 p.m.—In the course of the air fighting yesterday one German aeroplane was driven down in a damaged condition. One of our machines is missing.

The Casualty List.

Reported Feb. 7th.

Wounded.—White, Sec. Lt. H. G., Buffs (E. Kent Regt.), attd. R.F.C.

Previously reported Missing, now reported Died of Wounds as a Prisoner in German Hands.—Hall, Sec. Lt. G. S., R.F.C.

Oversea Troops.—Previously reported Missing, now reported Wounded and Prisoner in German Hands.—Davis, Lt. D. W., Canadian Gen. List, attd. R.F.C.

Died of Wounds.—R.F.C.—Mottershead, 1396 Sgt. T. (Widnes).

Reported Feb. 8th.

Missing.—Carbert, Capt. C. M., M.C., Canadian Infantry, attd. R.F.C.
McRae, Lt. D. J., Canadian Infantry, attd. R.F.C.

Reported Feb. 9th.

Wounded.—Brigham, Lt. K. B., R.F.A. and R.F.C.
Moore, Capt. G. M., R. Berks R., attd. R.F.C.

Missing.—Bronskill, Sec. Lt. F. H., R.F.C.
Daly, Capt. A. P. V., Connaught Rangers, attd. R.F.C.
Spicer, Sec. Lt. E. D., R.F.C.
Smith, Sec. Lt. S., R.F.C.

Reported Feb. 10th.

Wounded.—Miller, Sec. Lt. J. M. R., King's Own Scottish Bordrs., attd. R.F.C.

Missing.—Blythe, Sec. Lt. H., R.F.C.
Murray, Lt. P. W., Durham L.I. and R.F.C.
Whitney, Sec. Lt. R. T., R.F.C.

Reported Feb. 12th.

Killed.—Vernham, Sec. Lt. N. M. H., R.F.C.
Villiers, Sec. Lt. H. L., Dragoons, attd. R.F.C.

Died of Wounds.—Steele, Sec. Lt. A. H., R.F.C.

Previously reported Wounded, now reported Died of Wounds.—Boyd, Lt. J. W., Canadian Infantry, attd. R.F.C.

Wounded.—Coupal, Sec. Lt. A. B., R.F.C.
Curphey, Capt. W. G. S., M.C., R.F.C.
Massey, Sec. Lt. H. M., Sherwood Foresters and R.F.C.

Missing.—Bradford, Sec. Lt. G. W. B., R.F.C.
R.F.C.—Fleming, 14454 Cpl. R. D. (Carmunnock); Webb, 191 Flt. Sgt. W. G. (Kilburn, N.W.),

Reported Feb. 13th.

Wounded.—Boumphrey, Capt. G. M., R.F.C.
Findlay, Capt. L., Highland L.I., attd. R.F.C.

Killed or Died of Wounds.—Previously Missing, now reported by German Govt. Killed or Died of Wounds.—R.F.C.—Brain, 17094 1st Air Mech. N. L. (Auckland, New Zealand).

PERSONAL NOTICES

Deaths.

D'ADE.—1st Air Mech. Edward Reginald D'Ade, R.F.C., late of Balekpapan, Borneo, was accidentally killed on active service on Jan. 24th. He was the son of the late John George D'Ade, of Trinidad, B.W.I., and was 34 years of age.

* * *

DRAPER.—Sec. Lieut. Mark Denman Draper, R.F.C., killed while flying on Feb. 7th, aged 32, was the eldest son of the Rev. William Henry Draper, rector of Adel, near Leeds, and grandson of the late Justice Denman. He was educated at Repton School, and took up the dramatic profession, in which he had begun to make his way. In 1915 he joined the Artists Rifles, and only recently obtained a commission in the R.F.C.

* * *

FARROW.—Capt. Eric T. Farrow, R.F.C., killed on Feb. 7th, aged 19, was the only son of Mrs. Thomas Finney, of Brisbane, where he was born. He was educated at Mill Hill School and at Lausanne. On the outbreak of war he joined the Inns of Court O.T.C., and obtained a commission in the Middlesex Regt. In Oct., 1915, he transferred to the R.F.C., in which he secured a commission in Jan., 1916. He served for eight months at the front, where he received his captaincy. He was on duty with a reserve squadron, and was about to return to France when he met with his death while flying.

* * *

GROSSART.—Lieut. Robert Grossart, R.F.C., aged 24, was killed whilst flying in Yorkshire on Feb. 9th. His machine fell on a hill-top. Mr. Grossart lost control of his machine whilst nose-diving. He belonged to Dumfriesshire.

An inquest was held in Yorkshire regarding the death of Mr. Grossart. An agricultural labourer said he saw the aeroplane turn completely over, and crash to the ground in a field. He found the aviator dead inside his machine, which was in flames. A verdict of accidental death was returned.

* * *

HOLTOM.—Sec. Lieut. Jack Nicholson Holtom, R.F.C., who was previously reported missing, is now known to have been killed in action on Oct. 22nd, 1916. He was 23 years of age, and the son of Mrs. Amy Holtom, of 101, Sutherland Avenue, Maida Vale, N.W.

* * *

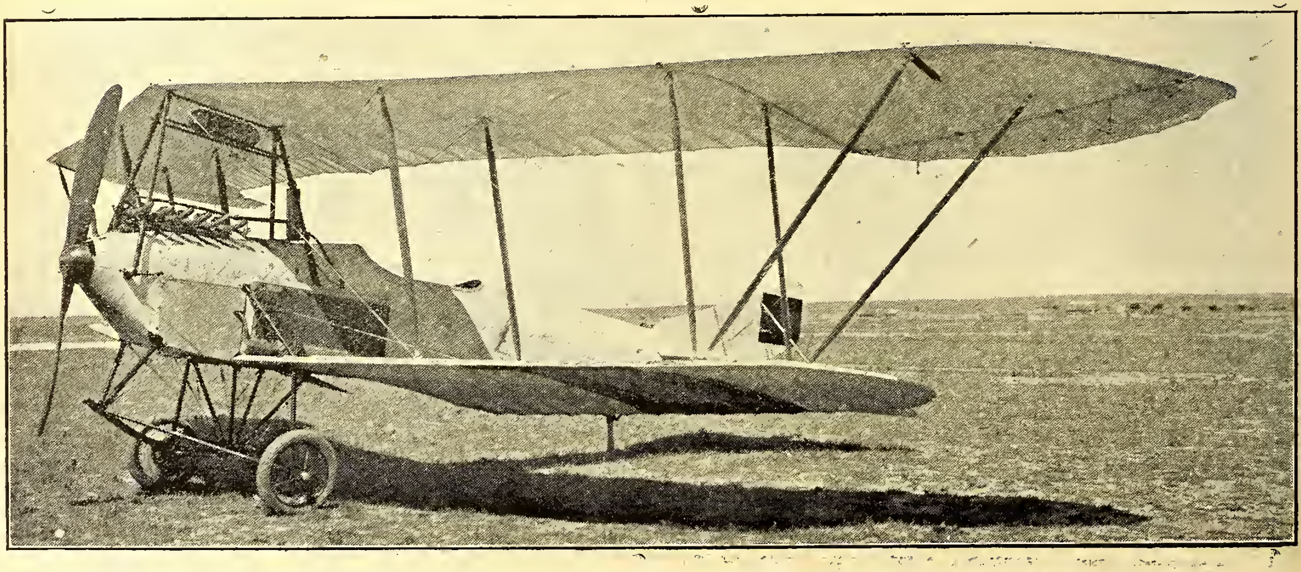
McMILLAN.—Captain John Casely McMillan, Royal Scots Fusiliers and R.F.C., died of wounds received while flying over the enemy lines on Feb. 6th, was the only son of Mr. and Mrs. John McMillan, of Brightlingsea, Essex, aged 24. Cape Town papers, please copy.

* * *

SEAGRAVE.—A flying fatality occurred at Chesterfield on Feb. 12th. Lieut. W. H. Seagrave, R.F.C., was journeying to a Midland town in a biplane when, owing to engine trouble, his machine came in contact with a tree-top. He received terrible injuries, the skull being fractured.

* * *

SPICER.—Sec. Lieut. Edmund Daniell Spicer, R.F.C., killed in action on Feb. 1st, was the younger son of Mr. and Mrs. Newton Spicer, of 37, Auriol Road, West Kensington, W. He was 18 years of age.



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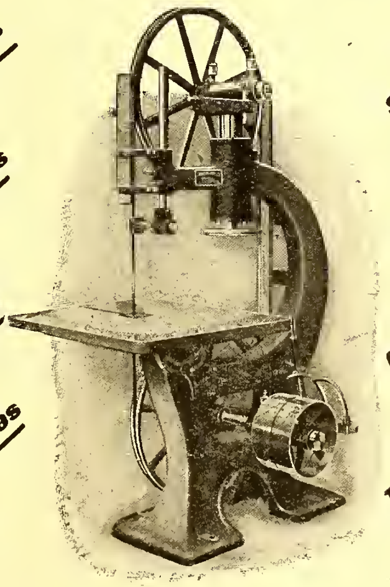

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STEAD.—Lieut. John Kenneth Stead, Yorkshire Regt., attd. R.F.C., younger son of Dr. J. E. Stead, F.R.S., was killed on Feb. 4th, in his 25th year. He was educated at Mill Hill and Durham University, where he studied at Armstrong College with a view to becoming a mining engineer, and was in the O.T.C. He received a commission in the Yorkshire Regt. in Sept., 1914, went to the front in April, 1915, and was wounded on the 29th of that month. In March, 1916, he was attached to the R.F.C., and returned to the front in the following July.

STEELE.—Sec. Lieut. Alfred Harmer Steele, R.F.C., who was killed on Feb. 4th, aged 25, was the elder son of Mr. Harmer Steele, solicitor, of Bankside, Arterberry Road, Wimbledon. He was educated at Wellington College, and after apprenticeship to Mr. Alexander Gibbs, the contractor for His Majesty's docks at Rosyth, he became an assistant engineer on the works, from which he was unable to obtain his release until July, 1916, when he enlisted in the R.F.C., and was, within a few weeks, motor dispatch riding at the front. He was recommended by his commanding officer for a commission, and was gazetted Sec. Lieut. in November, and shortly afterwards was flying over the enemy lines and obtained his observer's "wing."

His C.O. writes:—"He was always so cheerful and full of life, and his interest in his work would have got him on splendidly if he had only been spared; he had been doing splendid work during the last two weeks of fine weather, and we miss his help very much."

* * *

VILLIERS. — Sec. Lieut. Henry Lister Villiers. Dragoons, attd. R.F.C., was killed in action on Feb. 4th.

Mr. Villiers was the eldest son of Mr. and Mrs. T. L. Villiers, of Shapley, Winchfield, and Colombo, Ceylon, and was killed in an engagement in the air on Feb. 4th, aged 19. He was educated at Cheam and Wellington College, and passed into Sandhurst in May, 1915. He was gazetted to the Dragoons in the following Sept., went to the front in Feb., 1916, and was attached to the R.F.C. in Nov.

His Flight Commander writes:—"He was a universal favourite in this mess, and we were all fond of him. He was also a very promising observer, and knew his work, and was getting on very well; we all feel his loss very much."

* * *

WOODLEY.—Sec. Lieut. Stanley W. Woodley, R.F.C., reported killed, was the only child of Mr. S. Woodley, of Erskine Hill, Hendon, N.W. Mr. Woodley was commissioned in Nov., 1915, and went to the front in the following July. He was mentioned in dispatches for good work. He was educated as an architect and surveyor, in which profession he showed great promise. He was a probationer of the Royal Institute of British Architects, and served his apprenticeship under the late Mr. G. L. Sutcliffe, F.R.I.B.A., the architect to Co-partnership Tenants, Ltd., of the Hampstead Garden Suburb.

Engagements.

CULLEN—THOMPSON. — The marriage between Walter Douglas Cullen, Lieut., East Surrey Regt., attd. R.F.C., son of Mr. and Mrs. W. H. Cullen, Mickleham Downs, Surrey, and Gwendolen Margaret, only daughter of Mr. and Mrs. George W. Thompson, 80, Harley Street, W., will take place at St. Marylebone Parish Church, at 2.30 p.m. on Feb. 17th.

* * *

WADHAM—MAY.—The engagement is announced of Nicholas Wyndham Wadham, Lieut., Rifle Brigade, and R.F.C., eldest son of Mr. and Mrs. J. C. Wadham, 5, Cleveland Terrace, Hyde Park, and Barbara, only daughter of Mr. and Mrs. Morley May, of Brendon, Weston-super-Mare.

* * *

WALLER — LAMBERT. — The marriage arranged between Capt. W.H. de W. Waller, R.F.C., second son of Mrs. Waller, of Shannon Grove, Banagher, and Gwendolin, youngest daughter of Mr. and Mrs. John Lambert, of Redmount, Co. Galway, will take place next Saturday at Reading.

Marriage.

SPENCER—THOMPSON.—On the 3rd inst., at Holy Trinity Church, Bratton St. Maur, by the Rev. C. E. Spencer, assisted by the Rector, the Rev. G. H. Griffiths, Lieut. Rowland H. Spencer, R.A. and R.F.C., son of the Rev. R. E. Spencer, late vicar of Willington, Maidstone, and Mrs. Spencer, was married to Mary Harriet (Molly), younger daughter of Major J. W. H. Thompson and Mrs. Thompson, of 2, Southwick Crescent, W., and Bratton House, Wincanton, Somerset.

Births.

LANDON. — On Feb. 7th, at "Ivanhoe," Lansdown Road, Dublin, the wife of Capt. E. G. Landon, R.F.C.—a son.

MOSSOP.—On Feb. 2nd, at Bryn, Woodbridge, to Capt. N. R. Mossop, Suffolks, attd. R.F.C., and Mrs. Clara Mossop, a daughter.

* * *

SHIELD.—On Jan. 31st, at Swaffham, Norfolk, the wife (*née* Hewson) of Capt. H. S. Shield, M.C., North Staffs. Regt., R.F.C., of a son.

An extraordinary story of a mirage in the clouds is told by a young Flying Corps officer in the following letter to his father, published in the "Daily Telegraph":—

"I had often wondered what it would feel like to see a machine coming straight for one and to know that a collision was inevitable. I had the experience this afternoon, only the collision did not take place. I was on patrol with five other machines over the lines—(by the way, I am writing this like a novel, but I feel like it)—and had just gone into a cloud bank. Just before going in I saw the 'bus on my right turning to cross in front of me. All of a sudden I saw a machine just the same as my own appear out of the cloud about 50 ft. away, making straight for me. Instinctively I jammed my nose hard down and went as near a nose-dive as possible; the other 'bus did the same. I turned; the other turned into me. I was in a cold perspiration all over by this time, so I thought 'Here goes; if I am going to crash, it might as well be complete.' So straight for it I went. We got closer and closer, and biff! my machine and—its mirage in the clouds met.

"It seemed like a hideous nightmare, and I can still see that machine doing its utmost to crash into me. I think I can say I have had the full horrors of a collision in the air without its actually taking place. I finally got out of the clouds, and had not the faintest idea where I was, but about 15 seconds after 'Archie' reminded me that I was a little too low over his lines. Having got that off my chest, I think I will go to bed."

FRANCE.

Official Communiqués.

Feb. 7th.—Yesterday three enemy machines were brought down by our pilots. Lieut. Heurteaux brought down his 20th German machine, Adjudant Casale his fifth, and Adjudant Madon his sixth.

Towards 11 p.m. yesterday, German aeroplanes dropped several bombs on Dunkirk. There were no victims, and no damage was done.

Feb. 9th.—On Tuesday night (Feb. 6th) one of our aeroplanes dropped six bombs on the military establishments of Lahr (Grand Duchy of Baden). On the same night one of our air squadrons bombarded the aerodrome of Marialkerke (south of Ostend).

Some enemy aeroplanes dropped bombs in the region of Pont St. Vincent. Four civilians were killed and five injured.

A small German balloon, to which were attached 50 newspapers printed in the French language, fell on the trees near the Petit Palais, in the Champs Elysées, at 7 p.m., on the evening of Feb. 7th. It was secured and handed over to the military authorities.

Feb. 9th.—Yesterday evening and this morning German aeroplanes twice dropped bombs in the region of Dunkirk; four civilians were killed. The region of Frouard (south of Pont-à-Mousson) was also bombed; four persons were wounded.

It is confirmed that one of our pilots brought down a German aeroplane on the 7th near Cerny-les-Bucy (Aisne).

During the night of the 7th our bombarding aeroplanes dropped bombs on the military workshops and the railway station of Bernsdorf, as well as the station of Freiburg-in-Breisgau (Grand Duchy of Baden).

Feb. 10th, Afternoon.—A German aeroplane was brought down during the day yesterday near Régniéville-en-Haye by the fire of our anti-aircraft guns.

Last night one of our aeroplanes bombarded the railway station and barracks of Karlsruhe. The objectives were reached. The French machine, which started at 10.50 p.m., returned at 2.10 a.m., after having accomplished its mission.

Two German aeroplanes this morning bombed the region of Dunkirk, and dropped bombs twice last night and this morning on the town of Amiens. There were no victims at Dunkirk; one woman was killed at Amiens. Two bombs were also dropped at Nancy and on the region of Pont St. Vincent (south-west of Nancy). A civilian was killed and four were wounded.

Evening.—During last night numerous bombardments were carried out by our aeroplanes, particularly on the blast furnaces at Rombach and Hagondange, the railway station of Maizières and Tergnier, and the railway lines and workshops in the valley of the Sarre, where a train was derailed and set on fire near St. Ingbert.

Last night there were numerous aerial combats. Two enemy aeroplanes, including a triplane, fell in our lines after being hit by our pilots. One of them was accounted for by Lt. Guynemer, who has thus scored his 31st victory.

Feb. 11th, Evening.—An enemy aeroplane was brought down

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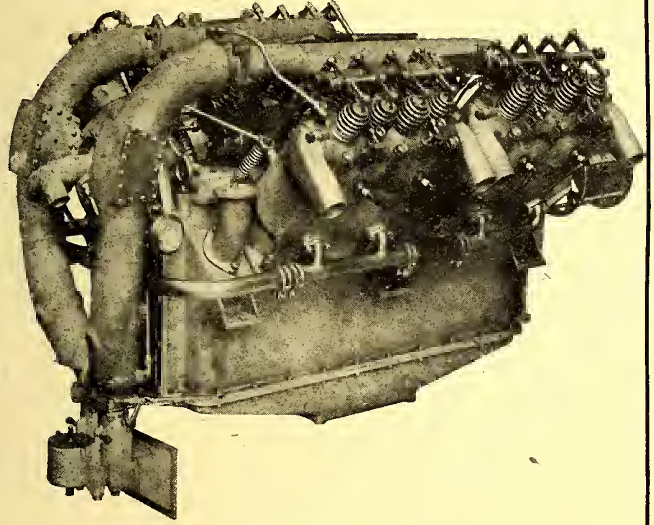

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by our anti-aircraft guns in the environs of Verdun. Bombs were dropped on Nancy and Pont St. Vincent without result.

In the course of numerous air fights yesterday two German aeroplanes fell in flames—one in the enemy lines, and the other in our lines. The latter was brought down by Lt. Doullin, who has now destroyed 11 enemy machines.

During the night of the 10th-11th, our bombardment squadrons carried out fresh operations in Lorraine against the factories and blast furnaces of the Sarre—Hargondage, Esch, and Maizières-les-Metz. A fire broke out near the Station of Arnaville.

The Colmar aerodrome and the port of Zeebrugge were also bombarded.

Feb. 12th.—It is confirmed that a German aeroplane was brought down in an air fight on Saturday in the region of Etouvelles (Aisne).

Last night our squadrons bombarded the stations of Stenay, Dun-sur-Meuse, and Athies.

GERMANY.

Official Communiqués.

Feb. 6th.—Enemy aviators have bombed Bruges, causing a fire in sheds there.

On Saturday evening a German naval seaplane successfully dropped bombs on the harbour works of Dunkirk. In some sheds a fire was caused which could be seen from a long distance on the seaplane's return flight.

Feb. 8th.—A British air squadron dropped bombs on the town of Bruges, with the result that seven houses were destroyed. A woman and 16 children were killed in a school, and two adults were badly injured. No damage was done to military buildings.

Feb. 9th.—During January our aviators, in spite of bitter cold, carried out important tasks of observation, reconnoitring, and attack.

We lost in the past month 34 aeroplanes. The British, French, and Russians lost altogether 55 aeroplanes in air fights or shot down from the ground, of which 29 were observed to be brought down within the enemy's lines, while 26 fell into our hands.

In addition, three hostile balloons were brought down in flames. We lost no balloons.

Feb. 10th.—Naval aeroplanes, on the night of the 8th, successfully dropped 66 bombs on the aerodrome at St. Pol, near Dunkirk. Several hits on the aerodrome were observed. All our aeroplanes returned undamaged.

During the night of Feb. 9th-10th several of our Flanders naval aeroplanes bombed the harbour and works of Dunkirk and the adjacent enemy aerodromes. Good results were observed.

Feb. 11th.—Reconnoitring and attacking expeditions were carried out by our aviation squadrons far behind the enemy's front. Important enemy military works and depots were effectively bombed during the day and night.

RUSSIA.

Official Communiqué.

Feb. 8th.—An enemy aeroplane dropped bombs in the region of Jakobstadt (between Riga and Dvinsk), killing seven men and wounding eight.

Two of our aviators dropped bombs on the enemy's aerodrome in the village of Kobylnik, north of Lake Narotch.

AUSTRIA.

Official Communiqués.

Feb. 6th.—Near Comanesti (Moldavia) an enemy battle aviator was compelled to make a forced landing during the course of an aerial engagement.

Feb. 8th.—An Italian aeroplane was shot down by a patrolling gendarme in the region of Berat.

ITALY.

Official Communiqués.

Feb. 11th.—Two enemy reconnoitring seaplanes have been brought down in the vicinity of Saseno (an island off the Albanian coast). The four aviators and one of the machines were captured. The other machine was sunk.

Feb. 12th.—Finer weather has favoured aerial activity: An enemy squadron dropped bombs on Le Vallone (Carso) without causing victims or damage. Two other machines endeavoured to make a raid on Udine, but were immediately repulsed by the fire from our anti-aircraft artillery and by our chaser-planes. After a brilliant combat over the town one of the enemy's aeroplanes was brought down, and the two wounded aviators taken prisoners.

Italian aeroplanes hombarded successfully the railway station of Opcina (near Trieste).

BULGARIA.

Official Communiqués.

Feb. 8th.—Macedonian Front.—An Allied aeroplane was brought down in our lines. The pilot and observer were killed. Another Allied aeroplane was shot down and fell in the Gulf of Seftera.

Feb. 11th.—There was lively aerial activity in the Vardar. Another Allied aeroplane was shot down in the Gulf of Seftera.

SERBIA.

Official Communiqué.

Feb. 6th.—There was great aviation activity by both sides. An enemy machine fell in the enemy lines south-east of Prilep after an engagement with one of our aeroplanes.

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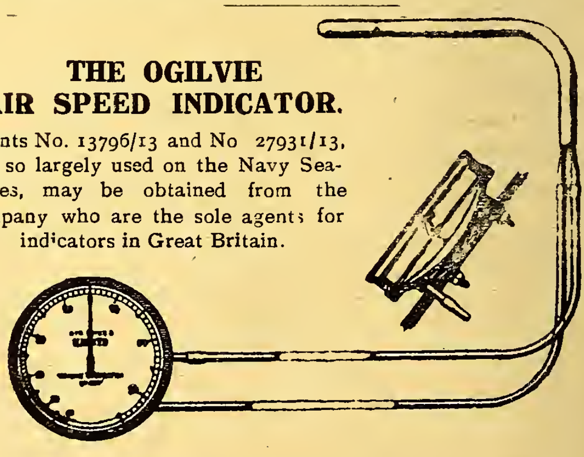

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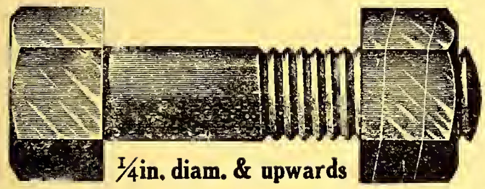

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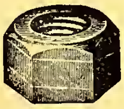

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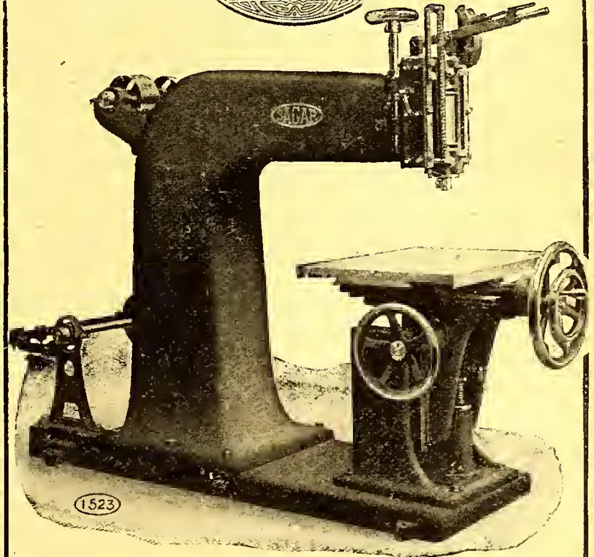

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THE AIR BOARD.

It was officially announced on Feb. 6th that the following is the composition of the Air Board:—

President, the Rt. Hon. Viscount Cowdray.
Parliamentary Secretary, Major J. L. Baird, M.P., C.M.G., D.S.O.
Fifth Sea Lord of the Admiralty, Commodore G. Paine, C.B., M.V.O.
Director-General of Military Aeronautics, Lieut.-General Sir David Henderson, K.C.B.
Controller of Aeronautical Supplies, William Weir.
Controller of Petrol Engines, Percy Martin.
Secretary, Sir Paul Harvey, K.C.M.G., C.B.
Assistant Secretary, H. W. W. McAnally.
Private Secretary to the Parliamentary Secretary, C. G. Evans.

The formation of the new Air Board is authorised by an Order in Council published in the "Gazette" of Feb. 6th, as follows:—

1. The Air Board shall, until it is by Order in Council otherwise directed, consist, in addition to the President, as follows:—

(a) A Parliamentary Secretary of the Board;

(b) The Lord Commissioner of the Admiralty who is charged with the direction of the Naval Air Services;

(c) The member of the Army Council who is charged with the direction of Military Aeronautics;

(d) The Controller of Aeronautical Supplies and the Controller of the Petrol Engine Department, of the Ministry of Munitions;

(e) Additional members as may from time to time be found desirable.

2. In the event of one or other of the officers named under the letters (b), (c), (d) above being unable to attend a meeting of the Board, the Department to which he belongs may designate an officer to attend in his place.

3. Members of the Air Board other than those who are appointed in virtue of the holding of certain offices shall be appointed by the President of the Board.

4. Members of the Air Board appointed in virtue of the holding of certain offices shall continue to be members of the Board so long as they hold those offices. Members appointed otherwise than as aforesaid shall hold their appointments at the pleasure of the President of the Board.

5. This Order may be cited as the Air Board Order, 1917.

The appointment of Commodore Paine to the Board of Admiralty is announced in the "Gazette" of Feb. 6th.

A VICTIM OF SCIENCE.

How a doctor at the Royal Aircraft Factory at Farnborough lost his life while conducting experiments was the subject of a coroner's inquest at the Cambridge Hospital, Aldershot, on Feb. 6th, on the body of Dr. Charles Van de Lear Burton, employed in the chemical research department at the factory.

From the evidence of Dr. Ramsbotham, the chief chemist at the Factory, it appears that on Feb. 3rd the deceased was conducting an experiment. By some unexplained means a syphon burst. He was immediately attended to and treated by a doctor, but he died the same evening. A verdict of accidental death was returned.

THE ROYAL AIRCRAFT FACTORY.

The retention of men of military age in the Royal Aircraft Factory at Farnborough was discussed at a special meeting of the Farnborough Tribunal on Feb. 7th. The Recruiting Officer, Captain J. R. Croxford, was present, and took part in the discussion.

The chairman explained that the meeting was the outcome of a joint meeting of the Aldershot and Farnborough Tribunals, at which the position of the employees at the R.A.F. was discussed, and from which a letter was sent to the Factory officials asking for information. A reply had now been received that since Oct. 1st, 1916, 161 married and 153 single men had been discharged from the Factory, and since Sept. 1st, 1916, a total of 473 men of military age had been discharged. The Recruiting Officer at Hartley Wintney was notified of the discharges.

Capt. Croxford said he did not think many of those 473 men were now in the Army.

The Chairman said he had been informed that there were 200 young men employed as draughtsmen in the Factory, and he would like to know whether they would not be rendering better national service in the Army.

[If they are the same 200 or so who were there before the recent change in administration, it is fairly safe to say that they *would* be doing better service in the Army. Moreover, 473 men is not a large number to comb out from 3,000 or so, though as it has all been done since Sept. 1st, it is in the right direction.—Ed.]

AERONAUTICAL POLITICS.

Lieut. A. Baldwin Raper, Royal Flying Corps, has been adopted as the prospective Unionist candidate for North-East Bethnal Green. Mr. Raper, who is not yet 28, is a member of the firm of C. Peto Bennett, merchants, of London and Liverpool, and has travelled extensively in Europe and the Near East.

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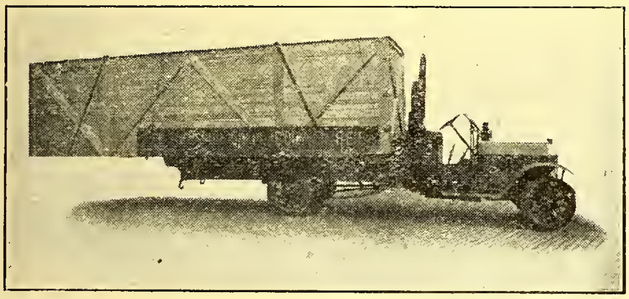

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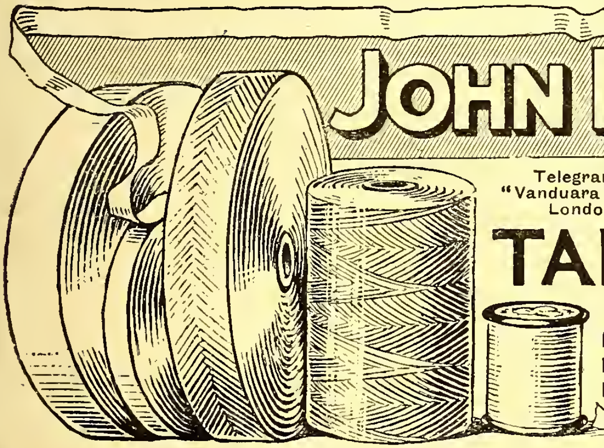

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A QUESTION OF A COMMISSION.

At Bow Street, on Feb. 2nd, before Mr. Garrett, Edward Fenner Allen, of Maidenhead, was charged on remand, with unlawfully wearing military uniform. The undisputed facts were that the accused was formerly a Lieutenant in the Royal Flying Corps. On Nov. 19th a notice appeared in the "Gazette" that he had relinquished his commission, and on Jan. 17th he was seen in a West-end restaurant still wearing his uniform.

Mr. Cecil Hayes, counsel for the defence, said he wished to correct a statement made at the previous hearing, and extensively reported in the Press, to the effect that his client had written a letter to his commanding officer expressing a wish not to fly any longer in consequence of the state of his nerves.

Capt. Hewett, Assistant Provost Marshal, who conducted the prosecution, explained that the letter to which he referred was written by a Commander of the Royal Flying Corps, who stated that he had received a report that Lt. Allen did not wish to fly any more. [The report does not say whether Wing, Squadron, or Flight-Commander.—Ed.]

Mr. Hayes: I only wish to take the earliest opportunity of saying that my client never wrote such a letter.

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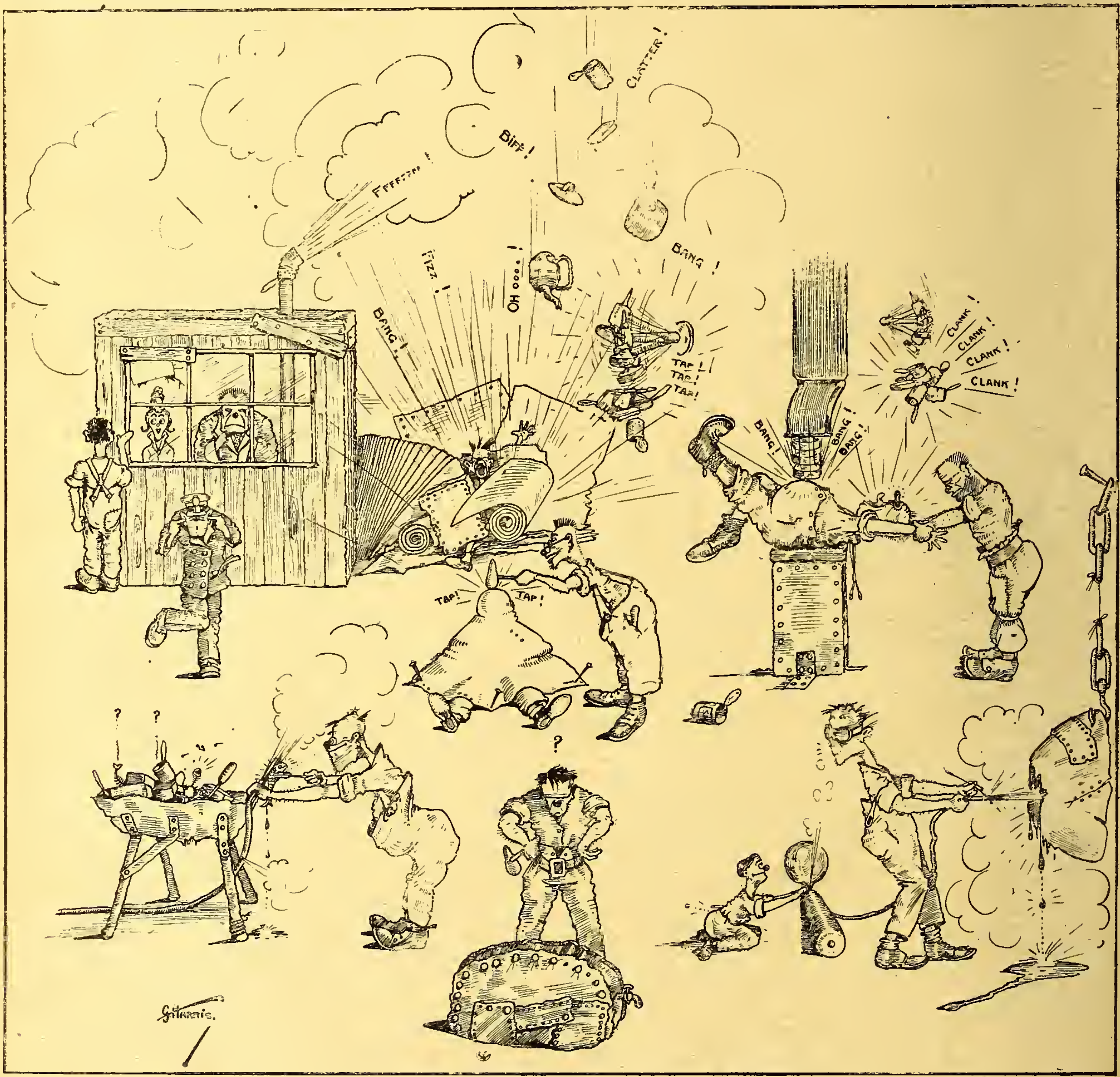
CLATTER!
BIFF!
FFFFFFF!
FIZZ!
OH....!
BANG!
BANG!
TAP! TAP! TAP!
CLANK! CLANK! CLANK! CLANK!
BANG! BANG! BANG!
TAP! TAP!
? ?
?
G. Harris.

SCENES IN AN AIRCRAFT FACTORY.—V.: The Coppersmith's and Tinsmith's Shop.—One remarks the doubt of the gentleman in the centre foreground as to what to do next with the tank. The acetylene welder on the right is apparently interrupted by the efforts of the shop-boy to fill a balloon from the gas-cylinder, and melts the engine-cowl while his attention is diverted. On the left a hungry worker toasts a bloater with a brazing pipe, while yesterday's skeletons emit queries as to their removal from the brazing hearth. Behind him an official inspector suffers from the general din, and the shop foreman reposes peacefully in his office, while his clerkess communicates expressively with an admirer. Next to the office one of the hands becomes involved with some raw material. Below him a scientific panel-beater uses an assistant as a "former" for an experiment in armouring, and to the right a herculean mechanic endeavours to flatten a fat friend under a power-hammer. The all-pervading noise is conveyed by the general atmosphere of the picture, though the pots and kettles may indicate the "spare-time hobbies" of the workers in some shops of this nature.

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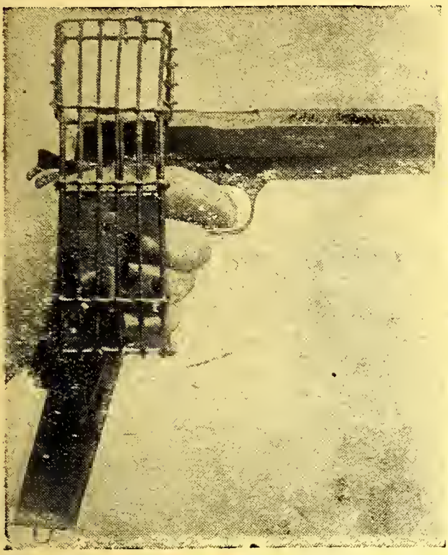

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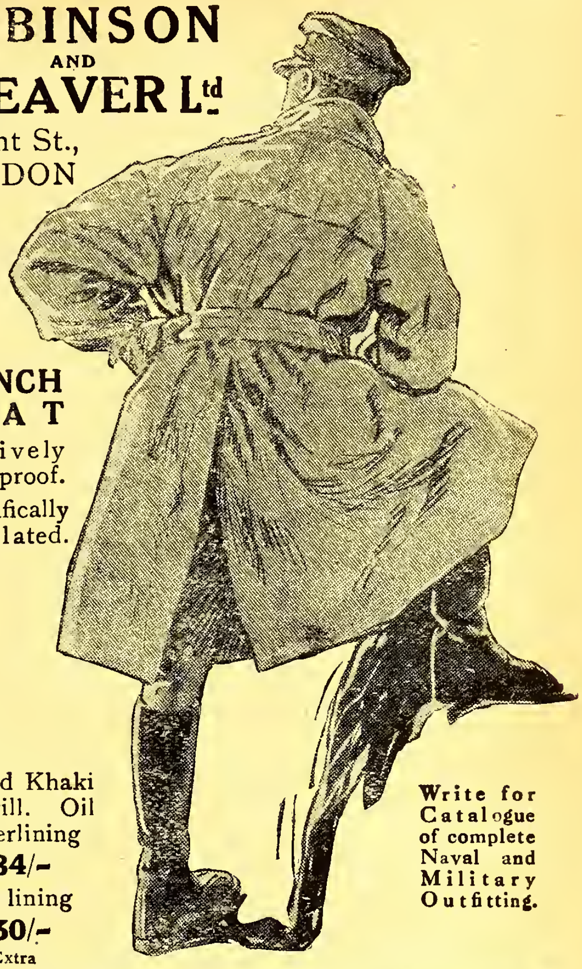

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Evidence was given by Lt.-Colonel Warner, Assistant Adjutant-General, Royal Flying Corps, who said the accused was asked to resign his commission but refused, and he was then told that if he did not do so he would have to relinquish it.

After the notice had appeared in the "Gazette," he wrote stating that he did not wish to relinquish his commission, and that he considered a great injustice had been done to him. He applied for reinstatement as a flying officer, but at a subsequent interview witness told him he did not think there was much chance of that.

Lt.-Colonel Warner made the noteworthy statement that he did not know that Mr. Allen had been refused an inquiry or court-martial.

Mr. Hayes contended that the accused had a lawful excuse for wearing uniform, and that it was a mistake that he should ever have been brought into court on such a charge.

At the outbreak of war he joined a public school corps and was quickly given a commission. He then obtained his pilot's wings in Norfolk, and was posted to the Expeditionary Force in France in May, 1916. His log books showed that he was a most capable and efficient flying officer.

On one occasion his observer, Lt. Powell, was shot dead, and he afterwards brought his body through a whole fleet of German machines back to the British lines. He was flying for three and a half hours, and his machine was riddled by German shells.

In consequence of that experience his nerves were badly shaken, and he came to England on leave. He had considerable correspondence with the authorities about his commission, and he asked for an inquiry into the report of an officer who thought he was not fit to fly.

As a matter of fact, he was perfectly willing to fly, but his request was refused, and the next he heard was from a friend who told him he had seen in the "Gazette" that he had relinquished his commission. He thereupon wrote stating that he never intended to do so, and again demanding an inquiry, he was informed that his case was under consideration, and that he would be notified when a decision had been made. It was in these circumstances that he continued to wear uniform.

At Bow Street Police Court, on Feb. 10th, before Mr. Garrett, Mr. Allen surrendered to his bail to answer the charge. Mr. Bodkin now appeared, with Capt. H. T. Hewett, Assistant Provost-Marshal for the London District, to conduct the prosecution; and Mr. Cecil Hayes, barrister, defended.

Mr. Hayes intimated that, acting on his advice, the defendant did not intend to contest the case further. Mr. Bodkin said that those who instructed him were prepared now, as they had always been, to admit that this was not a grave case. The defendant, however, had unquestionably committed a technical offence.

Mr. Garrett observed that the case had come to a very proper and desirable end, and expressed the hope that the defendant's services would continue to be retained for his country.

Meanwhile he would be bound over in his own recognisances of £10 to come up for judgment if called upon at any time within 12 months, and must pay £10 10s. costs.

[It would be of interest to know more about the allegation at the second hearing that an inquiry in the cancellation of Mr. Allen' commission had been refused, and whether there were any other than purely military reasons for that cancellation.—Ed.]

ZEPPELIN WRECKAGE.

The exhibition of Zeppelin wreckage in aid of charity in the grounds of the Middle Temple, Victoria Embankment, is now in full swing. The exhibits include wreckage and relics from all the enemy airships brought down in this country, including parts from the two ships brought down and sunk in the North Sea.

In addition, an exhibition of aerial photographs taken over the firing line has been arranged, and a Fokker aeroplane captured in France is on view. The proceeds go to various military charities, and contributions earmarked for the R.F.C. Hospital will be sent carefully to that institution.

"THE AEROPLANE SPEAKS."

The first edition of "The Aeroplane Speaks," by Captain H. Barber, R.F.C., is already exhausted, a fact at which one is not at all surprised. The second and revised edition will be ready in a few days. Owing to increased cost of production, it will be necessary to increase the price to 6s. 6d. net.

Probationers for the Flying Services who have not already studied this very fine exposition of the aeroplane will do well to order a copy without delay, as it is certainly the best all-round technical work on the practical side of aeronautics. Copies may be obtained from the William Dawson Publishing Co., Ltd., Rolls House, Breams Buildings, E.C., for 7s., post free.

LOOPING IN THE DARK.

As various statements have appeared in the Press regarding the question of who was the first aviator to loop the loop in the dark, it may be worth while, in the interests of historical accuracy, to state that this feat was first performed by the late Mr. Gustav Hamel at Eastbourne, on the night of Thursday, February 12th, 1914.

[*"Answers to Correspondents" are held over until next week, owing to lack of space.*]

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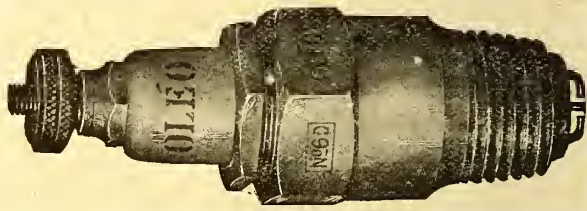

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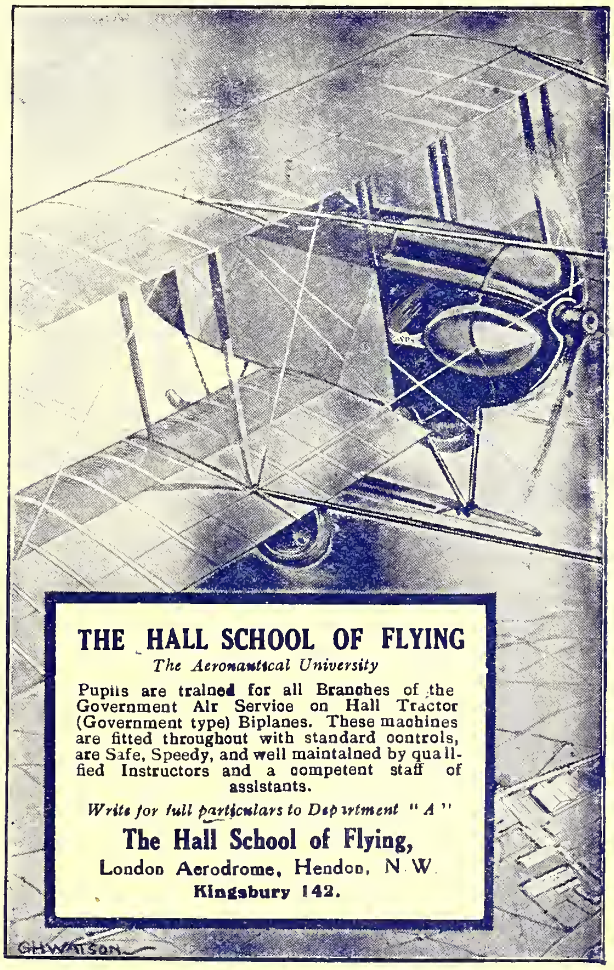

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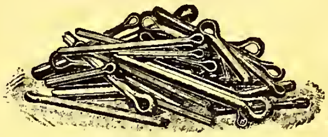

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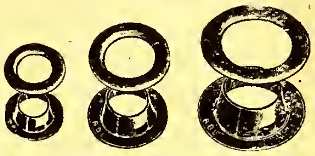

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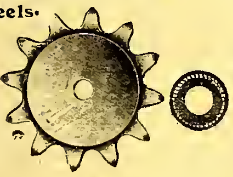

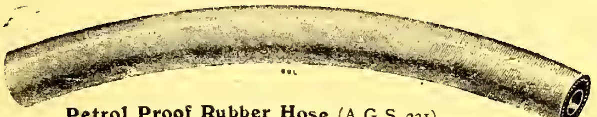

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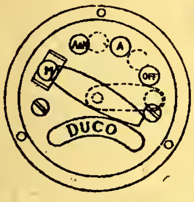

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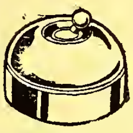

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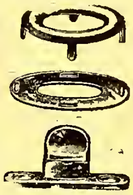

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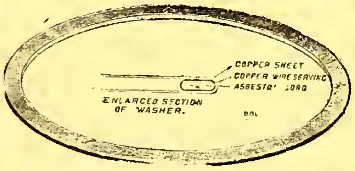

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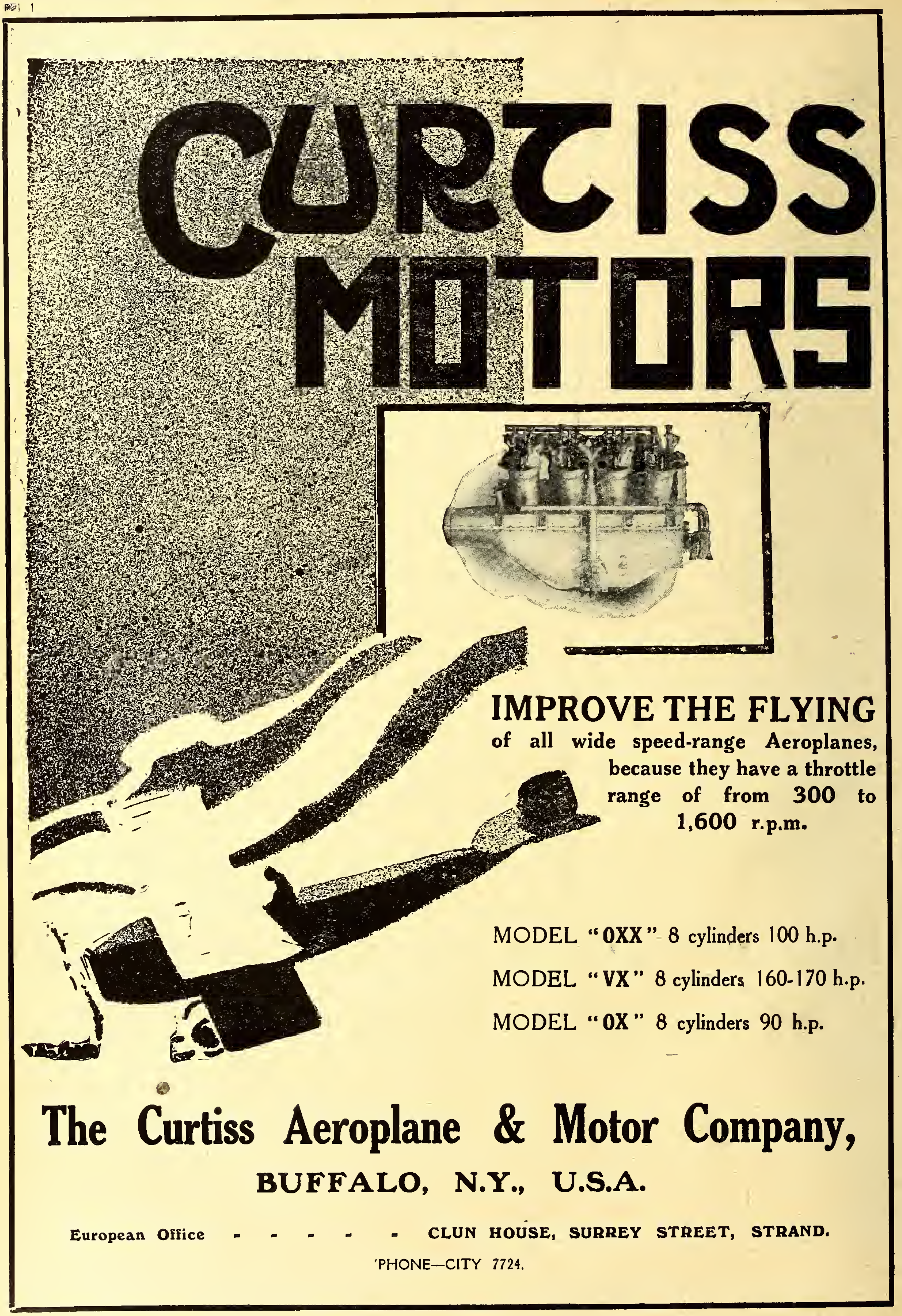

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The AEROPLANE

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ON SOME OF THE TASKS OF THE AIR BOARD.

Now that the Air Board is presumably settling down to its work, it seems well to consider some of the tasks which confront it. Most people know that the chief aim and object of the Board is to organise and co-ordinate the work of the Flying Services, and especially to expedite by every possible means the output of aircraft, and it is with the latter activity that this paper is immediately concerned.

In a general way, expediting output conjures up visions of miles of card-index cabinets, with hundreds of busy officials indexing and tabulating available sources of supply and arranging the allocation of material so that it may be used to the best advantage. One imagines a kind of glorified version of the Ford Factory "progress department" installed in the palatial halls of the Hotel Cecil and exalted in tone by officials in blue and khaki and gold lace and red tabs.

A description of such a department as it is, or as one hopes it soon will be, should provide a magnificent opportunity for those word-picture artists who are turned on from time to time to convey to the British taxpayer in the columns of the daily Press some idea of the great work which is being done by Government Departments in expending the six millions sterling per diem to which he contributes what money he can spare after eating and drinking more than the Food Controller considers advisable. Such word-artistry is beyond the ability of those concerned with this paper, so I propose merely to indicate a few of the detail tasks which the Air Board will have to tackle at one time or another, if it is to produce the absolute maximum of output, and to prevent, or reduce to a minimum, waste of labour, time, and material.

REAL WEALTH.

These three commodities represent the real wealth of the nation. Gold and credit cannot of themselves produce anything. They are merely convenient means of exchange or transmission. Intrinsically they are worth less than an electric cable minus the dynamo at one end and the motor at the other, and they fulfil much the same functions.

Therefore, when reference is made to waste of money, or excessive price, it may be understood that such phrases merely connote waste or excessive expenditure of labour, or time, or material, or all three or any two. The wealth of the British Empire, in cash and credit, may be inexhaustible, but there is a very distinct limit to the amount of labour and material available, and to the amount of time which can be spent over a given job, if that job, when finished, is to be of any real use in winning the war.

For example, a new type of aeroplane designed to-day may help materially to clear the sky of Huns, or to clear the sea of submarines, if sent into action six weeks or two months hence. But if time be wasted in futile arguments between theorists, and if the machine be not ordered for two or three months, and further theoretical arguments about details hang up its output, so that it is not sent into action for another six months—as has actually happened before now—then such a machine will not be in use till October or November next, by which date it will be out of date, whereas if it can be on active service in April it may help considerably to win the war.

If delayed by mere waste of time, then all the labour and material expended on it is also wasted, and so much of the nation's real wealth is completely lost. And precisely similar arguments apply to every detail of equipment, such as improvements in machine-guns, bombs, and even compasses and petrol-gauges.

TIME VALUE.

Time is the essence of the contract. It is better to hustle through a 20 per cent. improvement and get it into action in a couple of months than it is to hang it up and wait for a 100 per cent. improvement which is distinctly in sight, but which cannot possibly be produced for a year or so.

For instance, suppose we had a gun capable of firing shell which could destroy a submarine, and could be fired under limited conditions from a seaplane, that gun would be of immense value at this moment, despite its defects and limitations, and it would seem wiser to set it to work immediately on every available sea-patrol aeroplane than to refrain from using it because someone might have in hand some very perfect gun which could be used without any limitations months hence, when the submarine blockade has done all the harm it is going to do—whatever that harm may be.

We had a somewhat analogous example in 1915-1916. Somewhere in June or July of 1915, a Flight-Lieutenant R.N.A.S. named N. P. Billing designed a funny little pusher biplane which was nicknamed the "push-prodge." It was flown in the later days of 1915, and put up performances in speed and climb which far exceeded anything ever known so far as pusher machines were concerned.

Its early designs were the subject of much theoretical argument and waste of time. If it had been built promptly, it could have been used against the Fokker scourge of 1915-1916, and its performances prove that it would have abolished the Fokker at least as effectually as did the little de Havillands in early 1916.

As it turned out, engines for experiments were lent and withdrawn: orders were given and cancelled and altered: certain engines were specified and others were substituted which necessitated alterations in design: this, that, and the other modification was made by Admiralty "experts": and as a result one learns, not from the manufacturers (with whom, incidentally, Mr. N. Pemberton-Billing, M.P., is not connected), but from

Service gossip (which, of course, is not evidence), that machines of the "push-prodge" type are now, in February, 1917, being delivered.

Faute des mieux they may be used on active service, but more probably they will only be of use as school machines. Yet, nothing except pure waste of time, which is real national wealth, by theorists and perhaps by Service politicians, neither of whom can be considered as national assets, prevented those machines from being of definite value in winning the war.

This is, of course, a matter of ancient history, but it seems worth quoting as an instance of what to avoid in future, and the avoidance of repetition of past mistakes is one of the most important tasks of the Air Board.

The Streamline Wire Waste.

Let us now revert to another matter of more recent history, which seems to be current history also. Some weeks ago I mentioned casually that a certain type of big aeroplane had been ordered in quantities, and had only been proved useless for war purposes after many of them were actually built. In an effort to save their faces, the officials responsible for the mistake of ordering these machines endeavoured to increase their speed by decreeing that they should be fitted with streamline wires to reduce the head-resistance of the machines.

Owing to delays and mistakes and general departmental muddle, the orders for these wires were only given out to the manufacturers of this particular article when the machines had already been condemned as useless by active-service pilots. As the result, a few weeks ago the Government found itself with 80 (eighty) sets of these wires on order, at a price which, I am now told, is £105 (one hundred and five pounds) per set, a total order of £8,400, not a single set of that order delivered, and not a single machine in the Service to which they can be fitted, because all the aeroplanes for which they have been ordered have been deleted.

The wires, being specially made, cannot be used on any other machine, but apparently none of those concerned in the deal had the pluck to cancel the order, for that would have raised awkward inquiries as to why the machines were ordered in the first place without proper trial.

A Just Wrath.

One would not mind if someone had taken £8,400 in gold or jewels and had dropped them into the Thames, as James II dropped the Great Seal, but one grows angry when one thinks of highly skilled workmen putting in their best work in producing and fashioning special quality steel, to the value of, say, £4,000 (or 80,000 working hours at 1s. per hour), even allowing the other £4,400 as profit to the wire makers, and all to no purpose. When one remembers that all this waste of real wealth of labour occurs through some official who is only valued at a few hundreds of pounds per annum to the State by his paymaster, one grows still more angry. And when one considers that most of the waste might have been saved if someone had had the courage and honesty to cancel the order and risk the consequences to his miserable few-hundred-a-year self and his friends, one is moved by a just wrath to demand his head on a charger.

The cause of wrath does not cease even here, for another part of the story is that when the R.N.A.S. officially decided to delete these machines, before the streamline wires were made, a certain number of them were handed over to the R.F.C., who removed the highly modern and expensive engines, put them into machines of their own, which have a war-performance of sorts, and then burned the rest of the machine, which cost several thousands of pounds to build, even after deducting the engine, propeller, and the expensive instruments and fittings which could be put to some use.

It might be of interest to the Air Board to find out whether the R.F.C., which uses control-levers instead of warp-wheels, took the trouble to remove the wheels from these machines, or whether they were burnt with the rest of the machine because the R.F.C. had no use for them. These wheels cost quite a good deal in material and labour, so they ought to be worth saving.

The history of these streamline wires may be inaccurate in detail, but it is true in general outline, so I commend it to the consideration of the Air Board, so that a repetition of any similar mishap may be avoided.

In itself the incident indicates how difficult must be the task of the Air Board, unless it avails itself of all possible sources of information, suggestion, and criticism; for officials at the top cannot hope that things will run smoothly on their main lines if their schemes are side-tracked or held up by subordinate officials who would rather delay everything than disclose or confess to mistakes in their sub-departments and branch-lines.

Streamline Wires in General.

Apart from this particular streamline affair, I strongly commend to the particular department which deals with supplies a strict inquiry into the question of whether streamline wires ought to be used at all. This is an old argument, in which theory and practice disagree.

Theoretically, and in practice under theoretically perfect conditions only, streamline wires increase the speed of an aeroplane considerably. In practice under ordinary conditions they are of less value, because (a) these wires are only a true streamline when the machine is flying at one angle, so that when flying over or under that angle, as when at high speed near the ground or when above the "optimum" angle of the machine high up, they actually give more head-resistance than would an ordinary round cable, and (b) the slightest carelessness on the part of a mechanic will turn the wire so that, instead of the nose of the wire meeting the wind, the side of the wire meets it at an angle and sets up far worse head-resistance than a cable.

Short and Long Wires.

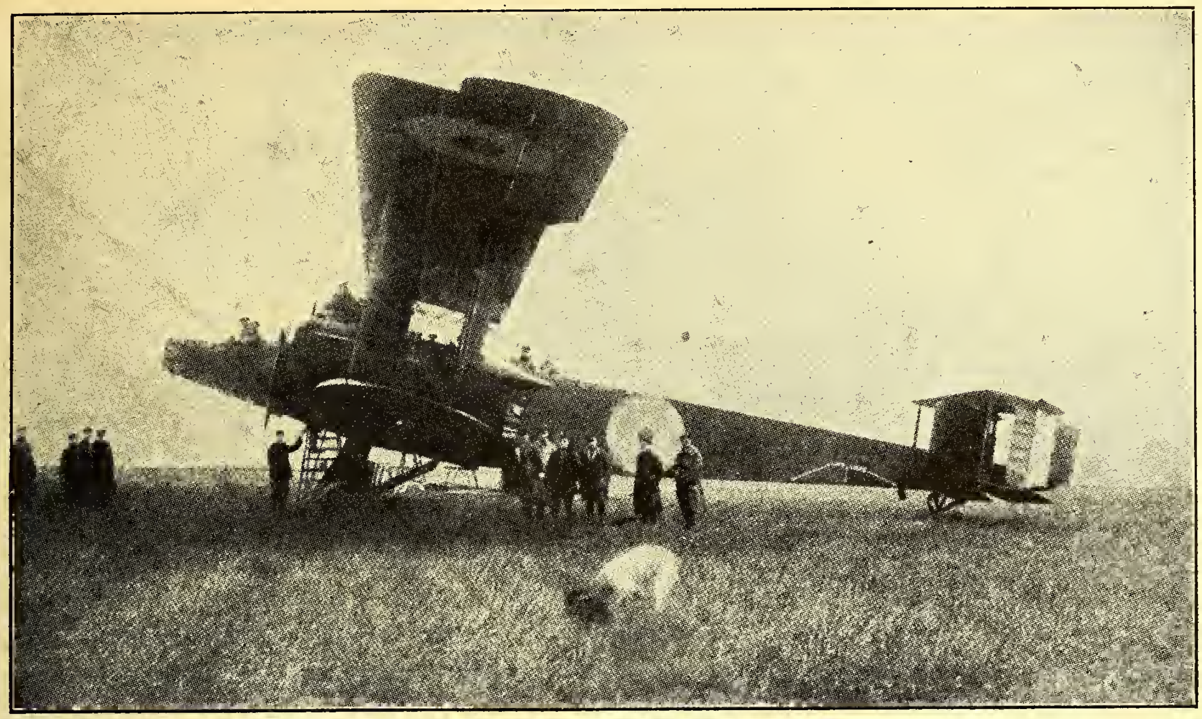
In very small aeroplanes, where the wires form a large proportion of the head-resistance, and where the wires are short and so do not vibrate much, there is a distinct gain in using streamline wires, but in big machines it is more than probable that they are an actual disadvantage. The mere length of the wire permits excessive vibration, which accounts for these wires breaking so frequently. Moreover, the length permits them to twist while vibrating and thus set up additional head-resistance. Being solid wires instead of cables, they are more liable to fracture owing to vibration, and it is more possible for an internal flaw to escape notice until actual fracture occurs.

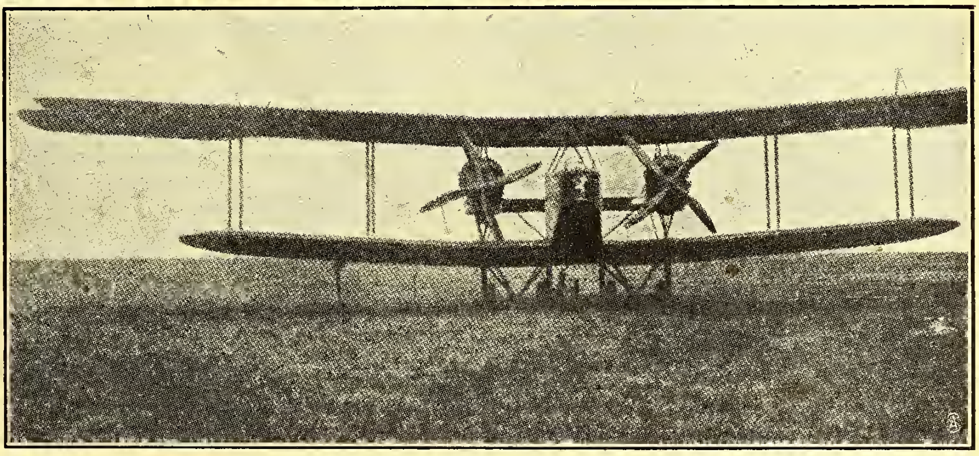
If anyone doubts the vibration, let him ask any pilot of any machine bigger than a "scout" whether he can hear his wires screaming above the sound of his engine. And besides the danger of fracture from this vibration, sound of this kind is evidence of dissipated energy.

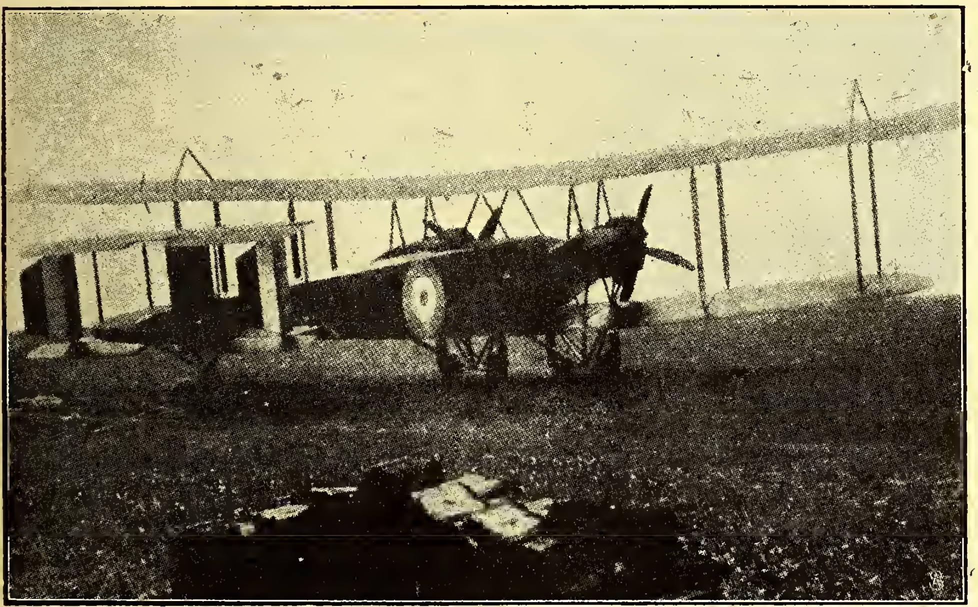
Furthermore, solid streamline wires are absolutely rigid, and therefore do not seem entirely desirable as ties in a flexible wooden structure like an aeroplane. Biplane wings tested with a sand load up to breaking point seem to show in the fracture of the wooden parts very curious stresses in the spars when held by these streamline wires, as against similar tests made with wings held by cables.

Twin cables suitably streamlined with wooden casings

IN THE HANDS OF THE ENEMY.







Ein engliſches Großflugzeug.

Wir bringen in beiſtehenden drei Abbildungen das Bild eines engliſchen Großflugzeuges, das bei Laon in unſere Hände gefallen iſt. Das Flugzeug kam direkt von Margate in England und ſollte durch die Beſatzung nach dem Flughafen Esquennoy ſüdlich Amiens verbracht werden. Die Inſaſſen verloren aber die Orientierung und erlebten das Mißgeſchick, dieſes neueſte Erzeugnis des engliſchen Flugbaues in vollkommen unbeſchädigtem Zuſtand an uns abliefern zu müſſen. Die Geſamtflügelſpannweite des Apparates beträgt 30 m, die Länge 20 und die Höhe 6½ m. Zwei 12-Zylinder Roll Royce-Motoren zu je 280 PS geben dem Flugzeug eine Geſchwindigkeit von 120-130 Stundenkilometer. Die Bewaffnung beſteht aus 3 Lewis-Maſchinengewehren, eins nach vorn, zwei nach hinten feuernd. Die Beſatzung beträgt 5 Mann.

The photograph reproduced above is taken from a German paper, and shows a twin-engined Handley Page biplane in the hands of the Hun The German description of the machine, freely translated, says: "The three pictures on this page are of an English giant aeroplane, which fell into our hands near Laon. The aeroplane came direct from Margate in England, and was being taken to the Esquennoy Aerodrome, south of Amiens.

"The occupants lost their direction, and had the misfortune to place in our possession an undamaged example of the newest production of the English aircraft works. The total span of the machine is 30 m. (about 98 feet), length 20 m. (about 65 feet), height 6½ metres (about 20 feet). Two 12-cylinder Rolls-Royce motors of 280 h.p. give the flying machine a speed of 120-130 kms.-p.h. (80-84 m.p.h).

"The armament consists of three Lewis machine guns, one firing forwards, and two firing backwards. The seating accommodation is for five persons."—[For which statements this paper takes no responsibility.—Ed.]

seem to offer advantages, at any rate in big aeroplanes. They cannot be twisted out of truth by careless mechanics. They give to some extent with the spars and struts. They are not liable to breakage from vibration. They consume only a fraction of the amount of time and labour in production. And if, when made up to length, the machine for which they were made has ceased to exist, they can be cut down for other machines.

MULTIPLICITY OF TYPES.

On this same question of streamline wires there is yet more work for the Air Board, should it be decided ultimately that these things must be used. The Navy, the Army, and certain individual manufacturing firms as well, all have different types of streamline wires. In some cases the actual streamline section of the wire differs from others. There are also different threads and different attachments.

In some there is a jaw on the wire, and an eyebolt on the attachment. In others there is a thread on the wire and an entirely different system of attachment.

Each individual wire has to be made for its individual place in each particular machine, so that no wire can be used anywhere else on that type or on any other. Consequently the lengths of the wires cannot be standardised, and every different attachment increases the multiplicity of types.

Where small scouts are being made in quantities, it should, at any rate, be possible to standardise to some extent without permitting different attachments according to whether the same machine is on order for the Navy or the Army. And, where big machines are concerned, I personally hold that solid streamline wires ought not to be used at all.

UNIFORMITY IN PRACTICE.

This same fondness for multiplying types apparently for the fun of doing it, or just to be different from someone else, seems to be a habit in the Services, and the Air Board has quite a nice task to procure uniformity in practice.

In such things as engine mountings one would expect uniformity, at any rate where the same engine is used by both Services. Yet here even one finds disagreement.

I have not myself measured the engines, but I am told by one of those unhappy beings whose job it is to "try to get a left-hand foot into a right-hand shoe"—so to speak—with paper and pencil and drawing-board, that the two Services insist on different mountings for that excellent and valuable engine, the Clergêt. It is only gossip and hearsay evidence, but it might be worth the while of the Air Board to find out whether, as a matter of fact, the back-plate for an R.F.C. Clergêt differs from the back-plate of an R.N.A.S. Clergêt, whether the R.F.C. Clergêt has a longer overhang in front of the back-plate than has one built for the R.N.A.S., and, if so, why?

Apparently both types are delivered promiscuously by either Service to manufacturers, and the unfortunate manufacturer has to swop over back-plates according to whether the next machine which needs an engine is earmarked for the R.N.A.S. or the R.F.C.

All of which seems particularly silly when one considers that on occasion the R.N.A.S. is compelled to hand over complete aeroplanes in flying order to the R.F.C.

STANDARD MOUNTINGS.

Surely it should be possible to secure uniformity between the two Services as regards any one engine, even if all engine mountings of similar types cannot be standardised.

One recalls that years ago the Isaacson engine was expressly designed to fit the back-plate of a Gnôme, so that, when it was developed to the point of beating the Gnôme and being made in quantities, it could be substituted on all Gnôme-engined machines. It never reached the point of being made in quantities, but the idea is worth resuscitating.

It does not seem beyond human ingenuity to design a back-plate, or a complete aeroplane nose, cowl and all complete, which would take all Clergêt, Gnôme, le Rhône, Anzani, and similar engines, and where there is any wide divergence between the engines it ought to be possible to alter the detail design of the engine to fit the standard back-plate.

Similarly there might well be a standard mounting and bonnet and nose for all 6-cylinder vertical engines, of the Renault-Mercédès, Beardmore, B.H.P., or Green types. And there might be another for the V types like the Rolls-Royce and Sunbeam.

These standards would have to vary for different sizes, for one could not expect a 90-h.p. 6-cylinder mounting to take a 200-h.p. 6-cylinder, nor could one expect a 150-h.p V mounting to take a 300-h.p. or 500-h.p. engine, but within rational limits these things could be standardised, and the engine designers would have to keep inside the limiting dimensions, and the aeroplane designers would have to design up to the standard nose, where tractors were concerned, or the standard nacelle-stern for pushers.

PRACTICAL STANDARDS.

In considering such questions the Air Board would do well to exercise great care in selecting the officials who would have to fix the standards. Nothing should be fixed without consultation with the Technical Committee of the Society of British Aircraft Constructors and of the Aeronautical Society.

So many clever young men in both Services like to fix arbitrary limits and lay down hard and fast rules just for the love of doing it, and such clever young men should be carefully avoided, or kept in their proper places.

They remind me of a story of a certain R.F.C. officer, who, driving from Adastral House the other day up Farringdon Road in the worst of the ice and snow, overtook a Post Office van endeavouring to climb the hill to Mount Pleasant. "Postie," a humane man, was leading his horse and keeping him well on the crown of the road, lest he should slither into the gutter if he once got onto the camber.

The R.F.C. officer hooted at him raucously to induce him to get over to his own side, and finally, finding it was no good, pulled in to the left and passed between the van and the pavement. As he crawled by, the R.F.C. officer growled at Postie, "What d'you think they made this side of the road for?" "Practice, I suppose," replied Postie, without turning a hair.

And the R.F.C. officer is still wondering whether he meant that the left half of the road was built as a practice-ground for immature motorists, or that it was built for practice in scientific road construction.

Anyhow, there are quite a lot of people in both Services who would cheerfully lay down a solid concrete road of rules and regulations and limits and processes and so forth, just for practice. And the Air Board would do well to fight very shy of this breed, for the high-class scientist who loves fixing standards just for practice is by no means certain to fix a practical standard, which is quite another thing.

REGULATIONS RUN RIOT.

For example, take a recent example of rules and regulations, of which I only hear by gossip, though there seems a sound foundation.

Quite a number of people in this country had been

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making aeroplane propellers for years before those Service authorities on this subject ever saw an aeroplane. It has always been the custom in propeller factories to saw out the laminæ of the propeller roughly, glue the whole lot into one solid block, jam them tight together with screw clamps, leave them to set for the proper period, and then carve the propeller out of the block.

Recently along comes some genius who decrees that lamination number two must be glued on to lamination number one, and left to set good and hard before lamination number three is glued on to the top of number two. And then one, two, and three must be left to set hard before number four is glued on top of number three. And so on up to seven, or eight, or nine, or ten, according to the number of laminæ, or layers, of wood there may be in the propeller.

Now it takes just as long for the glue between one and two to set as it would if all ten layers were glued up at once, and each subsequent layer takes equally long to set, so that in a ten-layer propeller the time wasted in waiting for the glue to set under the new regulation is just nine times as long as it is under the old, proved and tried successful system.

Which means that, in changing over from the old to the new system, output is materially decreased, until so many glued blocks have been built up that there are precisely nine times as many unfinished propellers lying about in various stages of gluing up as there were before. The mere question of room in which to house all these partly glued blocks "all pressed up and no place to go"—as it were—is likely to provide a problem in itself, and it means extra buildings, and more men, and more time, and more material wasted simply to comply with a whim of some official who probably saw a propeller for the first time a few months ago.

REASONS WHY.

If one wanted to be unkind, one might ask the Air Board to find out whether any of the propeller "experts" of either Service happens to have any personal or financial interest in any propeller business or timber business, and, if so, whether this gluing regulation is strictly observed in that particular propeller factory, or whether such a firm is permitted to run its work through in the old quick way while its competitors are delayed and annoyed by compulsion to observe the new rule.

In any case, such a rule means immense waste of time, and delayed output does not help to win the war, which is what most of us want, unless we are out for war-profits or official kudos.

So far as I can gather from those who have seen recently captured German machines, the wily Hun does not waste time and labour and material and fancy regulations. I am told that the modern German propellers are beautifully made mosaics, composed of short pieces of timber, such as our propeller "experts" would certainly reject, and that they are most skilfully jointed and glued and pressed together, so that they are as good as any of ours, and must cost far less in time and labour and material.

THE MATERIAL QUESTION.

That question of saving material is another of the Air Board's tasks which needs tackling in the light of reliable information.

I am told, merely as a matter of gossip, that one of the Services has been buying up timber from certain timber merchants at a considerably higher price than that at which aircraft manufacturers were buying it from the same merchants, and that aircraft manufacturers have now been asked, or desired, or instructed, or ordered, to buy the said timber from the said Service at very much more than their contract price. Also it is said that the timber merchants cannot supply at the contract price because their stock has been taken over by that Service.

Is this a new way of extracting war-profit taxation, or is somebody officially interested in or beholden to some timber merchant or other? Or why is it, any way? If the Services merely want to secure the available stock of timber, why not commandeer it at once, under the Defence of the Realm Act, and give the timber merchant the same price that he would get for it from an ordinarily keen buyer? He would be vastly better off then, and the country would do a better stroke of business than in the case of a man who pays a few hundreds a year income-tax and is pushed into the Army as a C. III man to empty slops, with the resultant loss to the country of his taxable value.

THE INNOCENT BUYER.

On the same subject I am told of an extraordinarily clever deal by some department or other. Presumably the Hun knows that we do not grow mahogany in this country, to any appreciable extent, and that in consequence we import a certain amount from America, as well as certain other timber, which must be nameless for fear of giving away State secrets. Anyhow, it is said that some clever young jack-in-office went and placed large orders recently with American timber sharps for special propeller timber, and quite forgot to specify seasoned timber.

Naturally the cute Yankee proceeds to supply just plain timber, as per contract, and carefully keeps all his well-seasoned stuff for home consumption or for higher bidders. Meantime propeller makers who are drawing timber supplies from Government sources will do just as well to watch out carefully, lest they find themselves saddled with sappy timber which will ruin the reputation of their propellers.

This little deal in timber may perhaps also be worth the while of the Air Board to investigate, for, after all, the reliability of propellers is pretty well as important as the supply.

Incidentally, some timber merchants ought to be doing themselves fairly well, so far as war-profits are concerned, for I heard the other day of certain firms refusing to sell a certain kind of timber at less than 14s. per cubic foot to a certain firm. A day or so later came a representative of another timber merchant, with whom the firm had never done business before, and proceeded to offer precisely the same timber at 8s. 6d. per cubic foot, in order to secure their first order. He admitted that he was not making a loss, even at 8s. 6d., so presumably the 14s. gentlemen were making quite a respectable profit.

CONSERVATION OF MATERIAL.

If it is necessary for the Services to buy aircraft material in order to conserve supplies, they can, nevertheless, buy at a reasonable price, and not outbid the very people who have to use the material either way. Still more can be done to conserve material by encouraging manufacturers to use economical methods of manufacture, and by impressing on inspectors, examiners, and viewers the fact that their job is to pass material which is fit for use, rather than to condemn half-finished or finished parts because of some purely technical fault.

In certain directions far more material is wasted than is used. Factories are still making spares, and even complete machines, of obsolete types, which is pure waste. Material is used in rebuilding useless machines. And parts are scrapped altogether which could well be used for some other purpose. There is much to be done by the Air Board in conserving material in these ways.

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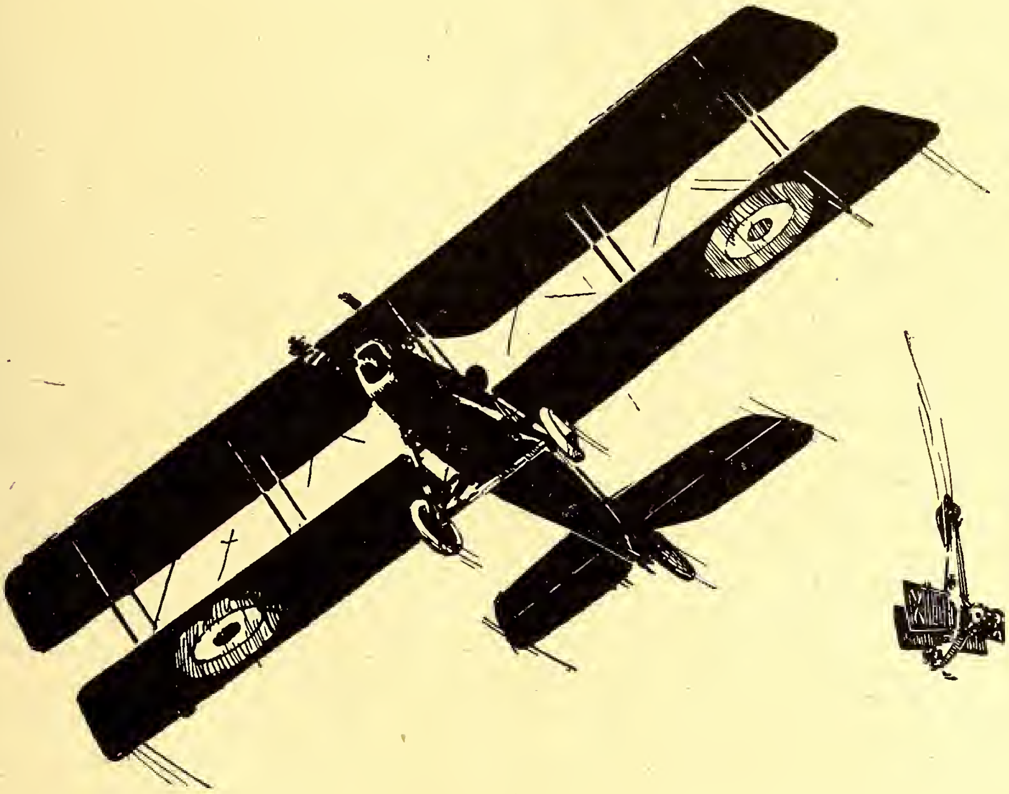
A BRITISH PILOT AND A—



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Certain materials are short, and, if the old methods are continued, there will soon be none at all. Which reminds one of a rather pleasing story of a patrol ship. The skipper, an old R.N.R. martinet, had for his signaller a volunteer seaman of considerable education and ability. The skipper had something of a down on this man because the latter had a way of taking responsibility on himself instead of rushing off to the skipper about every trifle.

One morning the signaller was on the bridge, watching the smoke of a 30-knot destroyer as she hurried over the horizon away from the patrol-boat and her solemn 10 knots. As he watched, the skipper hove up alongside him and demanded, "Signaller, what is that smoke doing over there?" "Vanishing, sir!" replied the signaller, with a perfectly immobile countenance which defied the skipper to haul him on the carpet for impertinence.

The question of material is something like that. If Service needs put the consumption up to the 30-knot speed, and our system of supervision plods along at its solemn old 10 knots, we are going to see our supply of material vanishing over the horizon in smoke. Which thing is by way of an allegory.

These are only a few of the tasks before the Air Board, and one hopes to give a few more examples in the near future. It is even possible that the Air Board itself may not as yet have come across some of these particular points for investigation and improvement. In which case one hopes that the Board will accept the suggestions as a small contribution on the writer's part towards winning the war.—C. G. G.

TRAINING.—V.

BY "BERKELEY."

The rigours and intensity of modern warfare make necessary the preservation of personnel by all means available. The length of time absorbed in adequately training troops for service in the field has increased the value of the individual in an army to a degree beyond all comparison with the standards of the past.

In the days of Wellington the physical condition of the nation was in the mass superior to that of to-day. The armies maintained overseas were smaller in comparison with the home population, and, despite the niggardliness of the Government, it was possible by embodying the Militia, and by keeping line regiments stationed at home at full strength, to maintain the fighting force abroad in some degree of efficiency.

In consequence, human life had no greater value in the eyes of the higher command than that which came from natural kindliness of heart. The desire to succour the wounded came only from humanitarian motives, and not from any well-considered intention of restoring the wounded for future use in the firing line. Thus the preparations made for the treatment of casualties were crude and meagre. Only the strongest and the most lightly wounded could recover from the well-meant efforts of the surgeons attached to the armies of Peninsular and pre-Peninsular days.

PHILANTHROPY AFORETHOUGHT.

It has become necessary in these later days to deal with the wounded with less regard to philanthropy. The necessities of war outweigh all other considerations. A soldier is no longer succoured only that he may be a joy to his friends in England, or to frustrate the proper hopes of his heirs and assigns, but in order that he may again take his place amongst those who are actively engaged in the extermination of the enemy.

The expense of his training in energy and money, and the length of time occupied, coupled with the increasing difficulty in finding replacements, and the lack of time in which adequately to train such replacements when found, all add to the value of the veteran soldier.

CASUALTY RETURNS.

The Central Empires have been particularly successful in returning a high percentage of wounded men to the armies in the field. Much of the disbelief professed by the cheaper news prints of the day for the official casualty lists of the common enemy arises from an entire lack of knowledge as to the skill of the Germans in dealing with evacuated casualties. We ourselves, having had time for preparation, are nowadays little if at all behind the enemy in the same matter.

There is no branch of the Army possessed of such powers as the Royal Army Medical Corps. Any measure ordered by the doctors, not directly interfering with the immediate progress of military operations, is carried through without protest. Not even the Olympians at the War Office can cancel a medical decision on a sick soldier, unless, indeed, it is proved that unfit personnel have been ordered to proceed on duty. The officers of the R.A.M.C. have amply earned by their devotion and skill all the power that has been placed in their hands.

TRANSPORT OF WOUNDED.

Before an action, the medical branch has to make preparations near the firing line, on the lines of communication, and at home for the reception and treatment of the wounded. Many dressing stations must be laid out as near to the front as possible. Farther back, but still within reach of shell-fire, are larger posts used as casualty clearing stations, each dealing with the casualties evacuated from a number of the advanced dressing stations.

From these positions to railhead the wounded are moved by motor ambulance. At railhead, cases requiring long treatment are sent by hospital train along already crowded lines to the coast for transmission by hospital ship to hospitals at home. The slightly wounded and the very seriously wounded are sent to hospitals behind the lines, the former in order that they may be returned to their units for the further dissemination of death, and the latter that they may recover sufficiently to be sent home without grave risk.

ORDER IN CHAOS.

All this is done with precision and certainty in the midst of the turmoil consequent on the maintenance of a modern battle. The stretcher-bearers bringing wounded to the dressing stations, and then to ambulances carrying them to the casualty clearing stations, pass to and fro through trenches crowded with reserves passing up to the firing line, with parties carrying S.A. ammunition, with orderlies carrying messages that would possibly be of equal import at any time during the next twenty-four hours, and, last but not least, harried by the constant attention of the enemy, whose duty it is to see that not only are men eliminated in the first line, but that such casualties shall, if possible, be made unreturnable.

The ambulances in their turn pass along roads already overladen with all manner of transport, each in its way essential to the adequate prosecution of the battle in being. Here again the enemy has demonstrated his

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consistent dislike for his opponents' habits by creating innumerable shell-holes along the more popular and useful strategic roads.

So, too, with the trains. The railways have no more space to spare than have the roads, and the hospital trains must pass up and down the line, submissive to the moves of the remainder of the traffic and at the same speed.

Links in the Chain.

There is nothing haphazard in it all. The doctor working swiftly and coolly within a few dozen yards of the enemy, the stretcher-bearer, the ambulance-driver, each individual in the chain is working at an allotted speed, with a definite object in view. Waste of time or laxity of organisation means a much greater loss of life, and consequently in the future a reduced opportunity of victory. It is not the success of working in the R.A.M.C. itself in the operations of war that is so wonderful, but the never-to-be-forgotten fact that the system and its operation is not adversely affected by many other systems working at the same time in the same neighbourhood and at equal pressure.

And yet there are people who consider "business" men capable of running an army in satisfactory replacement of those who have spent a lifetime in training for the trials of war, and not one of whom has made even the vestige of a fortune. The familiar Army "scandal," let it be remembered, is not caused by the professional soldier, but by those who are brought in from outside to assist in a time of crisis, and who are possibly annoyed by the sight of "business" men making huge profits out of the country's trouble.

So much for the services which lead up to and assist during and after the battle.

The Battle.

"War," said Karl von Clausewitz, " . . . is an act of violence intended to compel an opponent to fulfil our will," and "The Combat is the real warlike activity, everything else is only its auxiliary. . . ."

There is too much tendency at the present time to speak of the present disturbances in Europe as a war of attrition. There is something attractive to the stockbroker and the lawyer, the two dominating factors in Great Britain, in the vision of a starving Germany excluded from participation in the markets of the world, even if she has not yet suffered actual military defeat.

Time, to such as these, is of no account, and the manner of the subjugation of Germany has no interest to them. They believe that victory is ours by divine right, and that ultimate success is fundamentally denied to the enemy. They regret the continued loss of life, and deplore the increase in the super-tax, but they believe it to be necessary. There is consolation to us in that the G.O.C.-in-C. the Armies in the Field is not in agreement with their views.

A Conflict of Will.

War begins through a conflict of wills brought about by a convergence of international interests. It starts with a definite desire on either side for the acquisition of something, either material or theoretical, and opens with a clear intention of victory.

Unless the entire effort of a nation is thrown into the struggle, and battle is sought rather than avoided, no complete victory can come. Attrition is not confined to one camp. The hardships of the enemy blockaded from sources of luxury—the unobtainable is in itself a luxury—may stiffen the nation in its determination to resist to the end. Patriotism will be increased rather than reduced.

On the other hand, the blockading nation, if the war endures over a period of years, is likely to suffer from an attrition of interest or determination. Its leaders will speak of the victory that is born of patience, and its papers will paint in lurid colours the sufferings of the enemy, but still beyond the seas the death-roll will be growing bit by bit, and still the enemy will not be confined within the borders of his own country.

The enemy's power of resistance will not appear to decline. In the course of time the malcontents at home destroy the confidence of the people and, when victory is attained, if Fortune is kind, its due reward will be lost through the complete weariness of all the nations.

Therefore a phrase in Field Service Regulations, Pt. I, para. 99, sub-para. 2, is never forgotten by the trained soldier: "Half-hearted measures never attain success in war, and lack of determination is the most fruitful source of defeat."

(To be continued.)

THE R.N.A.S. COMFORTS FUND.

It has already been announced in The Aeroplane that the work of the R.N.A.S. Comforts Fund has now ceased for this winter owing to Mrs. Sueter having closed the Fund down. It is therefore requested that no further contributions, either in cash or kind, be sent, as Mrs. Sueter is shutting up her house and is taking a rest, which is well earned after dealing personally with nearly £5,000 worth of goods bought, besides all the contributions in kind.

Such goods and money as are still in hand will be adequately dealt with by other members of the committee.

The following cash contributions are acknowledged:—The Goldsmiths Company, £25; Mrs. Mackworth, £3 3s.; Flight Sub-Lieut. G. William, £1; Mr. and Mrs. Harold Hardy, £1 1s.; Mrs. Samson (collected), 5s.; Miss Pearce, 5s.; Mrs. Millbank, 2s. 6d.; total, £4,651 5s. 8d.

Mrs. Sueter desires to express her thanks to all those who have so generously contributed to the Fund.

GOOD ADVICE.

The following letter has been received, and is reproduced with pleasure:—

"We desire to draw renewed attention to the most interesting and artistic Exhibition of 'Aircraft Past and Present' which has been collected and arranged by Lady Drogheda for the benefit of the Flying Services Fund, which is administered by the Royal Aero Club and for the Red Cross.

"We scarcely think that the great merits of this most valuable collection have been sufficiently realised by the general public, although it has been very much appreciated by those who have visited it, including Queen Alexandra, T.R.H. Duke and Duchess of Connaught, Lady Robertson, and Lady Jellicoe.

"Full descriptions have already appeared in the public Press, and it is thus only necessary for us to say that for those desiring to acquaint themselves with the early history of Flying and its most recent developments, this Exhibition affords by far the easiest and most attractive method of attaining this object.

"The special reason of the Exhibition, namely, the provision of Funds for the benefit of the Flying Services, must appeal strongly to everyone. The skill and devotion displayed by these Services during the present great struggle are beyond praise.

"(Signed)

"A. K. Huntington (Acting Chairman, Royal Aero Club).

"R. M. Ruck, Major-General (Chairman, Aeronautical Society of Great Britain)."

Though a very large number of people have visited Lady Drogheda's Aeronautical History Exhibition, there must be many more, even among those closely concerned with aeronautics, who have not done so, and one hopes that none so concerned will fail to go before the exhibition closes, as it must do ere long.

A knowledge of history is essential to anyone who wishes to speak with authority on any subject, and this exhibition offers an easy and fascinating way of acquiring historical knowledge. Moreover, it is an artistic treat to anyone who is interested in painting, drawing, or engraving. And to the aeronaut and aviator alike it is of intense technical interest. Every reader of this paper who can possibly find the time should pay at least one visit to the Grosvenor Galleries in Bond Street during the next week.—C. G. G.

DUE CREDIT.

For some months it has been known that one day last year a British biplane beat all world's records by lifting the pilot and 21 passengers to a height of 7,000 feet. Now that the existence of the machine is known to the world, one can state that it was a Handley Page, piloted by Mr. Clifford B. Prodger, the American pilot.

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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Feb. 13th, 1917.

War Office, Feb. 13th.

REGULAR FORCES.—R.G.A.—Lt. E. C. Harrison, T.F., to be actg. Capt. whilst commanding an Anti-Aircraft Batt. (July 2nd, 1916) (substituted for the notification under "R.F.A." in "Gazette" of Nov. 22nd, 1916).

TERRITORIAL FORCE.—R.F.C.—Capt. F. M. Green to be temp. Maj., Dec. 12th, 1916.

R.G.A.—The following announcement is substituted for that in "Gazette" of Jan. 13th :—Sec. Lt. (temp. Lt.) W. G. Cleghorn is secd. for duty with the R.F.C., Nov. 11th, 1916.

Infantry.—L'pool R.—Sec. Lt. E. Blythe is secd. for duty with R.F.C., Jan. 16th.

Arg. and Suth'd Highrs.—Sec. Lt. (temp. Lt.) J. D. S. Denholm is secd. for duty with the R.F.C., with precedence as from Aug. 29th, 1916, Jan. 31st.

Cheshire R.—Sec. Lt. F. H. Astle is secd. for duty with the R.F.C., Jan. 16th.

W. Rid. R.—Sec. Lt. G. W. Benson is secd. for duty with the R.F.C., Jan. 16th.

* * *

From the "London Gazette" Supplement, Feb. 13th, 1917

The King has been pleased to award a Bar to the Military Cross to the following officers :—

Sec. Lt. (temp. Lt.) Gilbert Ware Murlis Green, M.C., Gen. List and R.F.C.

He brought down two enemy machines on successive days under adverse circumstances. He has displayed great dash and courage at every opportunity. (M.C. awarded in "Gazette" dated Jan. 1st, 1917.)

Lt. (temp. Capt.) John Whitaker Woodhouse, M.C., R.F.C., Spec. Res.

For conspicuous gallantry on three occasions in attacking Zeppelis airships over land and sea. (M.C. awarded in "Gazette" dated Jan. 14th, 1916.)

The King has been pleased to confer the Military Cross on the following officers in recognition of their gallantry and devotion to duty in the field :—

Sec. Lt. (temp. Lt.) Edwin Louis Benbow, R.F.A. and R.F.C.

He has on several occasions displayed great courage and skill, and has destroyed four enemy machines under difficult conditions.

Sec. Lt. (temp. Capt.) Joseph Cruess Callaghan, R. Muns. Fus. and R.F.C.

He displayed marked courage and skill on several occasions in carrying out night bombing operations. On one occasion he extinguished a hostile searchlight.

Lt. (temp. Capt.) Arthur Ramsay Stanley Clarke, Dorset Regt. and R.F.C.

He carried out successfully and quickly some artillery registration that was urgently needed. He has previously on very many occasions shown great courage and skill.

Capt. Edgar Stanley Rogers, R.G.A., attd. Anti-Aircraft Battery.

He showed marked courage and coolness in destroying an enemy aeroplane while his guns were under heavy and accurate shell-fire. He set a splendid example throughout.

Temp. Capt. John Bowley Quested, R.F.C.

He manœuvred his machine with great skill, and thereby enabled his observer to bring down a hostile machine. He has on many previous occasions displayed great courage and ability.

His Majesty the King has been graciously pleased to award the Meritorious Service Medal to the undermentioned non-commissioned officer in recognition of valuable services rendered with the Armies in the field during the present war :—

3270 Sgt. J. W. Todd, R.F.C.

* * *

From the "London Gazette" Supplement, Feb. 14th, 1917.

War Office, Feb. 14th.

REGULAR FORCES.—Establishments.—R.F.C.—Sqdn. Comdr.—Temp. Capt. R. Chadwick, M.C., Gen. List, from a Flt. Comdr., and to be temp. Major whilst so employed, Feb. 1st.

Flight Comdrs.—From Flying Officers.—Sec. Lt. H. M. Massey, Notts and Derby R., and to be temp. Capt. whilst so employed, Dec. 30th, 1916. Capt. A. G. R. Garrod, M.C., Leic. R., Spec. Res., Jan. 26th.

Flying Officers.—Temp. Lt. P. J. V. Lavarack, Gen. List, Nov. 5th, 1916. Temp. Sec. Lt. E. B. Low, Gen. List, Jan. 18th. Lt. W. W. Stratton, Canadian A.S.C., Jan. 22nd. Lt. G. S. O'Brien, Canadian Divl. Cyclist Corps; Temp. Sec. Lt. W. Anderson, M.C., Cam'n Highrs., and to be transfd. to Gen. List; Sec. Lt. G. H. Harrison, Midd'x R., T.F., Jan. 23rd. Temp. Sec. Lt. (on prob.) R. M. Swyer, Gen. List, Jan. 24th. Sec. Lt. H. M. Coombs, R.F.A., T.F.; Temp. Sec. Lt. J. Lawson, Gen. List; Temp. Sec. Lt. E. J. Smart, Gen. List; Sec. Lt. A. G. Robertson, R. Highrs., and to be secd., Jan 25th. Capt. A. G. R. Garrod, M.C., Leic. R., Spec. Res., but with seny. from Nov. 22nd. 1915. Sec. Lt. (on prob.) S. Roche, Spec. Res.; Sec. Lt. L. C. B. Sheppard, Som. L.I., Spec. Res., and to be secd., Jan. 26th. Sec. Lt. R. J. Macpherson, Dorset R., and to be secd.; Temp. Sec. Lt. F. J. Martel, Gen. List, Jan. 27th.

Equipment Officer, 3rd Cl.—Temp. Capt. S. J. Malcolm, attd. Arg. and Suth'd Highrs., and to be transfd. to Gen. List, Jan. 25th.

Memorandum.—Sub-Lt. D. M. F. Sinclair, from R.N.V.R., to be temp. Lt., Gen. List, for duty with R.F.C., Jan. 18th.

OVERSEA CONTINGENTS.—Canada.—Infantry.—Gen. List.—Temp. Lt. H. Allan resigns his temp. commn. on appt. to R.N.A.S., June 10th, 1916.

* * *

A special supplement to the "London Gazette" dated Feb. 14th records the following award by the President of the French Republic :—

November 9th, 1916.

Legion of Honour.

Croix de Commandeur.—Major and Brevet Col. (temp. Major-Gen.) Hugh Montague Trenchard, C.B., D.S.O., A.D.C., R. Scots Fus.

The King has given unrestricted permission to wear the decoration.

* * *

From the "London Gazette" Supplement, Feb. 15th, 1917.

War Office, Feb. 15th.

REGULAR FORCES.—Establishments.—R.F.C.—Flying Officers.—Lt. R. I. Van der Byl, Canadian Gen. List, Jan. 17th. Temp. Lt. D. M. F. Sinclair, Gen. List, Jan. 18th. Sec. Lt. (temp. Lt.) J. L. Blackwood, Lond. R., T.F., Jan. 23rd. Temp. Lt. W. R. B. Annesley, R.E., T.F., from a Flying Off. (Observer) (with seny. from Oct. 21st, 1915); temp. Sec. Lt. W. Bagnall, attd. Sco. Rif., and to be transfd. to Gen. List; temp. Sec. Lt. (on prob.) F. D. Holm, R.E.; temp. Sec. Lt. R. H. S. Hunter, Gen. List; Sec. Lt. (on prob.) C. A. Brown, Spec. Res., Jan. 26th.

Flying Officers (Observers).—Sec. Lt. E. J. D. Townsend, R.A., and to be secd., Nov. 15th, 1916, seny. Jan. 16th, 1916; temp. Lt. W. T. Breach, A.S.C., and to be transfd. to Gen. List, Aug. 24th, 1916, seny. July 29th, 1916; temp. Lt. J. B. Hall, A.S.C., and to be transfd. to Gen. List, Jan. 17th, 1917, seny. Aug. 26th, 1916; Sec. Lt. L. D. Fawcett, Australian Imperial Force, Dec. 26th, 1916, seny. Sept. 25th, 1916; Sec. Lt. (temp. Capt.) R. H. Rusby, Glouc. R., T.F., Jan. 21st, 1917, seny. Sept. 29th, 1916; temp. Sec. Lt. J. Mitchie, Gen. List, Jan. 20th, 1917, seny. Sept. 30th, 1916; temp. Sec. Lt. R. V. Nalder, attd. Midd'x R., and to be transfd. to Gen. List, Dec. 26th, 1916, seny Oct. 3rd, 1916; temp. Sec. Lt. (on prob.) G. H. Glendenning, Gen. List, Jan. 26th, 1917, seny. Oct. 4th, 1916; Lt. G. N. Mills, Australian I.F., Dec. 26th, 1916, seny. Oct. 6th, 1916; temp. Sec. Lt. A. Baillie, R. Highrs., and to be transfd. to Gen. List, Jan. 17th, 1917, seny. Oct. 6th, 1916; temp. Lt. W. F. Hellyar, A.S.C., and to be transfd. to Gen. List, Jan. 20th, 1917, seny. Oct. 8th, 1916; temp. Sec. Lt. L. C. Welford, Gen. List, Jan. 22nd, 1917, seny. Oct 11th, 1916; temp. Sec. Lt. G. L. Graham, attd. Hrs., and to be transfd. to Gen. List, Jan. 21st, 1917, seny. Oct. 13th, 1916; temp. Sec. Lt. (on prob.) C. S. Emery, Gen. List, Jan. 20th, 1917, seny. Oct. 15th, 1916; temp. Sec. Lt. (on prob.) F. H. Austin, Gen. List; temp. Sec. Lt. (on prob.) D. E. Greenhow, Gen. List, Jan. 17th, 1917, seny. Oct. 15th, 1916; temp. Sec. Lt. (on prob.) J. A. Vessey, Gen. List, Jan. 27th, 1917, seny. Oct. 15th, 1916; Sec. Lt. J. M. Sim. Gord. Highrs., T.F., Jan. 21st, 1917, seny. Oct. 16th, 1916; temp. Sec. Lt. (on prob.) F. G. Brockman, Gen. List, Jan. 18th, 1917, seny. Oct. 16th, 1916; temp. Sec. Lt. H. A. Chuter, R. Fus., Jan. 21st, 1917, seny. Oct. 17th, 1916; Sec. Lt. N. Macgregor, Arg. and Suth'd Highrs, T.F.; temp. Sec. Lt. (on prob.) R. Ritchie, Gen. List, Jan. 19th, 1917, seny. Oct. 21st, 1916; Lt. R. M. Smith, Australian Light Horse, Dec. 26th, 1916, seny. Oct. 24th, 1917; Lt. M. Moore, York and Lanc. R., and to be secd.; Sec. Lt. F. G. Truscott, M.C., Suff. R., T.F., from temp. Lt. Lond. Divl. Cyclist Corps, Divl. Mtd. Troops, T.F., Jan. 20th, 1917, seny. Oct. 26th, 1916; temp. Sec. Lt. J. Senior, W. York R., and to be transfd. to Gen. List, Jan. 28th, 1917, seny. Oct. 26th, 1916; Sec. Lt. T. F. Northcote, King Edward's Horse, Spec. Res., and to be secd., Jan. 24th, 1917, seny. Oct. 26th, 1916; temp. Sec. Lt. (on prob.) L. G. Banks, Gen. List, Jan. 18th, 1917, seny. Oct. 26th, 1916; Lt. M. R. D'Arcy, Ind. Army Res. of Officers, Jan. 4th, 1917, seny. Nov. 3rd, 1916; temp. Sec. Lt. (on prob.) A. H. Steele, Gen. List, Jan. 24th, 1917, seny. Nov. 4th, 1916; temp. Sec. Lt. (on prob.) H. B. Griffiths, Gen. List, Jan. 22nd, 1917, seny. Nov. 8th, 1916; Sec.

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Lt. (temp. Lt.) B. Balfour, Lond. R., T.F., Jan. 21st, 1917, seny. Nov. 11th, 1916; temp. Lt. E. G. Green, R.E.; temp. Sec. Lt. (on prob.) G. R. F. Waner, R.E., Jan. 20th, 1917, seny. Nov. 14th, 1916; Sec. Lt. C. P. Tiptaft, M.C., Corn. Rang., Spec. Res., from temp. Lt. R. Ir. Rif., and to be secd. Jan. 17th, 1917, seny. Nov. 15th, 1916; temp. Sec. Lt. (on prob.) C. J. Baylis, Gen. List, Jan. 21st, 1917, seny. Nov. 15th, 1916; Sec. Lt. W. J. Lidsey, Oxf. and Bucks L.I., T.F., Jan 24th, 1917, seny Nov. 25th, 1916; temp. Sec. Lt. R. S. Rudd, Devon R., and to be transfd. to Gen. List, Jan. 21st, 1917, seny. Nov. 27th, 1916; Lt. G. M. A. Hobert-Hampden, Oxf. and Bucks L.I., T.F.; Temp. Sec. Lt. A. G. Severs, attd. Midd'x R., and to be transfd. to Gen. List, Jan. 20th, 1917, seny. Dec. 16th, 1916.

Equipment Officers, 2nd Cl.—Lt. L. A. McDougald, Spec. Res., from the 3rd. Cl., Jan. 29th. 3rd Cl.—Sec. Lt. (on prob.) H. J. Birtles, Spec. Res., Jan. 12th.

TERRITORIAL FORCE.—R.E.—The following announcement is substituted for that which appeared in the "Gazette" of Nov. 27th, 1916:—Sec. Lt. (temp. Lt.) H. S. Ripley is secd. for duty with the Anti-Aircraft Section, Oct. 23rd, 1916.

* * *

A special supplement to the "London Gazette," dated Feb. 15th, contains the following:—

War Office, Feb. 15th.

The King has been pleased to approve of the following reward for Distinguished Service in the Field, with effect from Jan. 1st, 1917, inclusive:—

The Military Cross.

Capt. (temp. Major) John Theodore Cuthbert Moore-Brabazon, R.F.C., S.R.

* * *

The following are among the Decorations and Medals awarded by the Allied Powers at various dates to the British Forces for distinguished services rendered during the course of the campaign. The King has given unrestricted permission in all cases to wear the Decorations and Medals in question:—

Conferred by Field-Marshal His Imperial Majesty the Emperor of Russia.

Sept. 12th, 1916

Order of St. George, 4th Class.

Sec. Lt. (temp. Capt.) A. Ball, D.S.O., M.C., Notts and Derby Regt. and R.F.C.

Order of St. Anne, 3rd Class (with Swords).

Capt. (temp. Lieut.-Col.) J. G. Hearson, D.S.O., R.E. and R.F.C.
Capt. (temp. Lieut.-Col.) P. L. W. Herbert, Notts and Derby Regt. and R.F.C.
Major (temp. Lieut.-Col.) F. W. Richey, R.A. and R.F.C.

Order of St. Stanislas, 2nd Class (with Swords).

Capt. (temp. Lieut.-Col.) A. E. Borton, D.S.O., R. Highrs. and R.F.C.
Capt. (temp. Major) R. G. Cherry, R.F.A. and R.F.C.
Capt. (temp. Major) A. Christie, R.A. and R.F.C.
Capt. (temp. Lieut.-Col.) P. H. L. Playfair, M.C., R.A. and R.F.C.

Medal of St. George, 1st Class.

1465 Sgt. R. B. Mumford, R.F.C.
364 Actg. Sgt.-Maj. G. Thornton, R.F.C.
5800 Actg. Sgt. J. H. Waller, R.F.C.

3rd Class.

13687 Cpl. H. Young, R.F.C.

4th Class.

6326 1st Cl. Air Mech. J. I. T. Jones, R.F.C.

Conferred by H.M. the King of Serbia.

Sept. and Oct., 1916.

Order of the White Eagle, 3rd Class (with Swords).

Lieut.-Col. Commandant and Hon. Col. (temp. Brig.-Gen.) J. G., Marquess of Tullibardine, M.V.O., D.S.O., Yeomanry.

5th Class (with Swords).

Temp. Capt. C. H. Elliott-Smith, Gen. List and R.F.C.

Order of Karageorge, 4th Class (with Swords).

Lieut. (temp. Capt.) Lord Lucas, Yeomanry and R.F.C.

Cross of Karageorge, 2nd Class (with Swords).

3575 Cpl. R. James, R.F.C.

Silver Medal.

4118 1st Cl. Air Mech. G. Hodgson, R.F.C.
1513 Cpl. H. Miller, R.F.C.

Aug. 27th, 1916.

Order of Karageorge.

Lieut. (temp. Capt.) J. O. C. Orton, Norfolk Regt. and R.F.C.

Cross of Karageorge, 1st Class (with Swords).

30 Actg. Sgt.-Maj. W. Jones, R.F.C.

Gold Medal.

1479 1st Cl. Air Mech. R. F. Fillmore, R.F.C.

* * *

From the "London Gazette," Feb. 16th, 1917.

Admiralty, Feb. 12th.

Temp. Proby. Flt. Sub-Lts. to be temp. Flt. Sub-Lts.:—H. E. Weaver, Oct. 4th, 1915; C. B. De T. Drummond, Jan. 12th, 1916; G. E. Nash, Feb. 3rd, 1916; W. S. Oliver, March 22nd, 1916; W. G. R. Hinchliffe, E. B. J. Walter, April 3rd, 1916; K. H. Millward, May 14th, 1916; W. C. Ault, May 16th, 1916; L. C. Pincott, May 28th, 1916; R. G. Begg, H. Lawson, June 11th, 1916; R. G. Clarke, June 25th, 1916; F. G. Browne, June 26th, 1916; C. A. Narbeth, June 28th, 1916; H. H. Gonyon, June 30th, 1916; C. Hanson-Abbott, W. G. Westcott, July 2nd, 1916; E. T. Hayne, July 5th, 1916; A. W. Farquhar, July 7th, 1916; A. W. Fletcher, July 12th, 1916; F. S .G. Lewis, Lord Ossulston, July 16th, 1916; R. A. Blyth, E. D. Crundall, A. E. Hall, H. W. Found, July 20th, 1916; H. F. Delarue, T. S. S. Hood, P. C. Wood, July 30th, 1916; G. Andrews, Aug. 6th, 1916; W. G. Little, Aug. 13th, 1916; O. J. Gagnier, Aug. 15th, 1916.

Temp. Proby. Flt. Officer to be temp. Flt. Sub-Lt.:—N. D. Hall, Jan. 18th.

Feb. 13th.—Proby. Flt. Sub-Lt. J. N. Cooper, R.N., who relinquished his appt. on account of ill-health contracted in the Service, to retain his rank.

War Office, Feb. 16th.

REGULAR FORCES.—Establishments.—R.F.C.—Flying Officers (Observers).—Sec. Lt. (temp. Lt.) J. D. S. Denholm, Arg. and Suth. Highrs., T.F., Jan. 3rd, but with seny. from Aug. 20th, 1916; temp. Sec. Lt. W. B. Long, Oxf. and Bucks L.I., Jan. 31st, with seny. from Sept. 1st, 1916, and to be transfd. to Gen. List; temp. Sec. Lt. (on prob.) H. R. Hare, Gen. List, Jan. 29th, but with seny. from Oct. 5th, 1916; temp. Lt. A. R. Brassington, Leins. R., Jan. 31st, but with seny. from Oct. 15th, 1916; temp. Sec. Lt. (on prob.) A. M. Turnbull, Gen. List, Jan. 29th, but with seny. from Nov. 10th, 1916; temp. Lt. D. Kingsley, Sea. Highrs., Jan. 19th, but with seny. from Nov. 25th, 1916; Sec. Lt. R. S. B. Beckett, Ind. Inf., Jan. 19th, but with seny. from Nov. 30th, 1916.

Park Comdr.—Temp. Capt. E. A. Goodwin, Gen. List, from an Equipt. Officer, 1st Cl., and to be temp. Maj. whilst so empld., Jan. 1st.

Equipt. Officers, 1st Cl.—From the 2nd Cl.—Temp. Capt. L. Sadler, A.S.C., Jan. 1st; Sec. Lt. (temp. Lt.) E. Stokes, Spec. Res., and to be temp. Capt. whilst so empld., Jan. 25th.

3rd Cl.—Temp. Lt. R. W. Smart, attd. Notts and Derby R., and to be transfd. to Gen. List, Oct. 23rd, 1916.

Memoranda.—A. A. M. Weir to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Jan. 23rd.

To be temp. Qrmr., with hon. rank of Lt:—R.F.C.—H. G. Dadley, Feb. 1st.

* * *

From the "London Gazette" Supplement, Feb. 16th, 1917.

Admiralty, Feb. 16th.

The King has been pleased to give orders for the appointment of the following officer to be Companion of the Distinguished Service Order:—

Flight Lieut. Stanley James Goble, D.S.C., R.N.A.S.

For conspicuous bravery and skill in attacking hostile aircraft on numerous occasions. On Nov. 7th, 1916, he attacked an enemy scout and chased it down to 1,500 ft., when it was seen to land, crash into a fence, and turn over in a field. On Nov. 27th, 1916, he attacked four hostile scouts, one of which he brought down in flames. On Dec. 4th, 1916, on six different occasions during the same flight, he attacked and drove off hostile aircraft, which threatened the bombing machines which he was escorting, one of the hostile machines going down completely out of control.

The King has also been pleased to approve of the award of the Distinguished Service Cross to the following officers:—

Flight Comdr. William Geoffrey Moore, R.N.A.S.

In recognition of the excellent work which he has done in East Africa, and especially on Jan. 10th, 1917, when he flew a distance of 300 miles from Ubena to Mahenje. He obtained important results in bombing flights.

Flight Lieut. Lionel Conrad Shoppee, R.N.A.S.

For conspicuous gallantry and enterprise during a bomb attack by aircraft on an important enemy railway bridge. A subsequent reconnaissance showed that the whole of the centre section of the bridge had collapsed into the river, thereby interrupting important enemy railway communications.

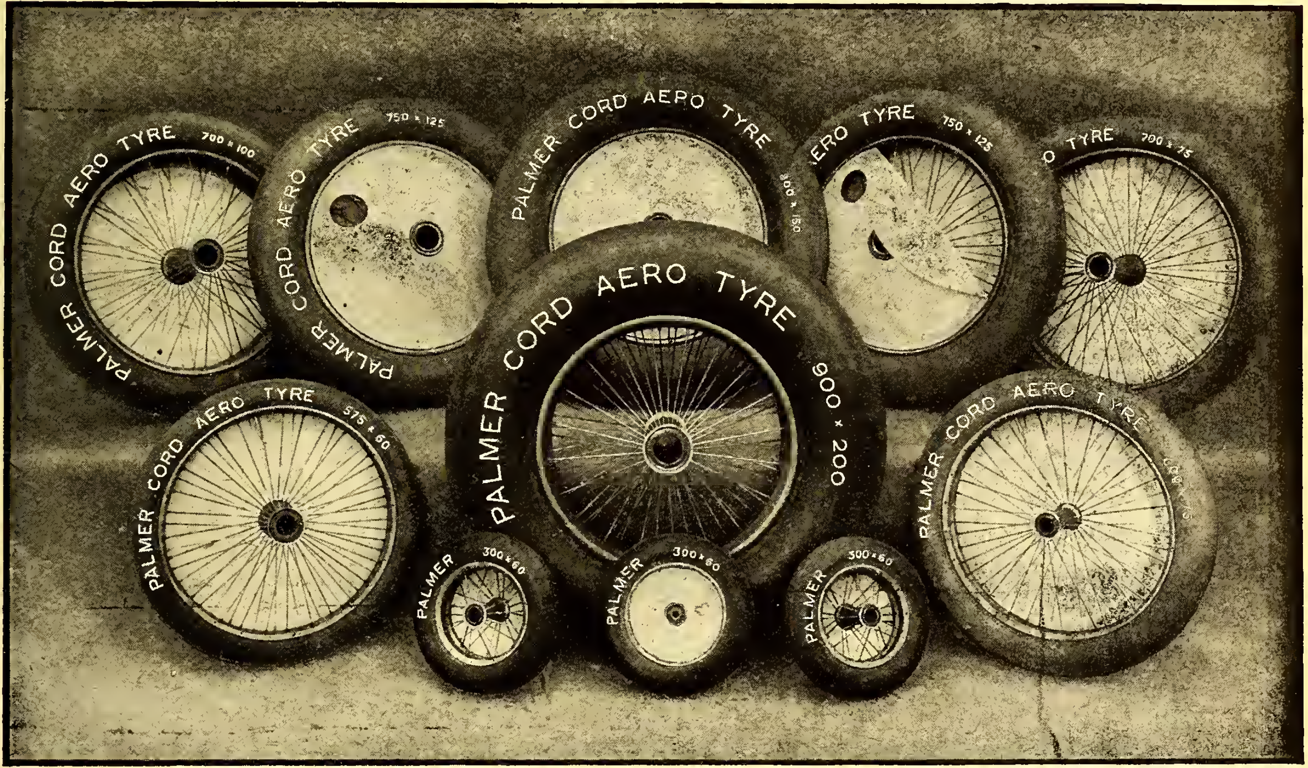
Flight Lieut. Edward Rochfort Grange, R.N.A.S.

For conspicuous gallantry and skill on several occasions in successfully attacking and bringing down hostile machines, particularly on Jan. 4th, 1917, when during one flight he had three separate engagements with hostile machines, all of which were driven down out of control. On Jan. 5th, 1917, he attacked three hostile machines, one of which was driven down in a nose-dive. On Jan. 7th, 1917, after having driven down one hostile machine, he observed two other enemy aircraft attacking one of our scouts. He was on the way to its assistance when he was attacked by a third hostile scout. He was hit in the shoulder by a bullet from this machine, but landed his aeroplane safely in an aerodrome on our side of the lines.

(*Continued on page* 514.)

PALMER

CORD TYRES and WHEELS For AEROPLANES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Tyre Sizes	Wheel No.	Hub		Track Line	Tyre Sizes	Wheel No.	Hub		Track Line	Tyre Sizes	Wheel No.	Hub		Track Line
		Length	Bore				Length	Bore				Length	Bore	
		m/m	m/m	m/m			m/m	m/m	m/m			m/m	m/m	m/m
300×60	16	111.12	25.4	Central	700×75	9	178.	44.45	132/46	750×125	18	178.	44.45	132/46
,,	17	72.39	12.7	Central	,,	20	178.	38.09	132/46	,,	26	150.	40.	Central
					,,	75	178,	31.75	132/46	,,	33	150.	38.09	Central
450×60	30	89,	31.75	Central	,,	80	178.	44.45	132/46	,,	38	178,	38,09	132/46
										,,	66	178.	38.89	132/46
575×60	14	150,	38.09	104/46	700×100	2	185.	55.	135/50	800×150	8	185.	55.	135/50
,,	21	160,	28.	Central	,,	4	185.	55.	Central	,,	10	185.	55.	Central
,,	34	150,	31.75	104/46	,,	18	178.	44.45	132/46	,,	36	185.	55.	135/50
					,,	26	150.	40.	Central	,,	40	185.	60.32	135/50
600×75	14	150.	38.09	104/46	,,	33	150.	38,09	Central					
,,	21	160.	28.	Central	,,	38	178.	38.09	132/46	900×200	42	185,	60.32	125/60
,,	34	150.	31.75	104/46	,,	66	178.	38.89	132/46	,,	47	185.	55,	125/60
					750×125	2	185.	55.	135/50	1100×200	52	185.	55.	116/69
					,,	4	185.	55.	Central	,,	57	185.	55.	Central

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The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

IV.—VICKERS LIMITED.

The fact hardly needs emphasising that the name of Vickers is one of the greatest in the world of engineering, and the firm would inevitably have been brought within the realm of aviation at the outbreak of war even if that course had involved a new application of its vast resources. But there was no need to bombard Vickers Limited with blue-prints from the Royal Aircraft Factory, for already this famous engineering firm had several years of experience behind it in the way of aeroplane production, and was free to go ahead with the development of its own designs on an enlarged scale when the dogs of war were let loose and machines were wanted urgently at the front. It was able to do even better than that; already it had practicable machines in hand, and was able to deliver to the War Office gun-carrying biplanes which were only too badly needed.

Major H. F. Wood.

The Why and Wherefore.

This pleasing state of things was due entirely to the foresight, ability and energy of Major Herbert Frederick Wood, who has been the head and forefront of the Vickers Aviation Department, so far as aeroplane production is concerned, from the first.

Graduating as a pilot in November, 1910, he joined the Vickers firm in April of the following year, and went up to Barrow-in-Furness. There he found the ill-fated "Mayfly," a British-built rigid airship, sitting in the water preparatory to its first flight, but had no part in the designing of the leviathan itself.

Although the 'Mayfly" failed to answer to expectations, there was just one feature of its construction which I may recall here, and that was the fact that it had a pointed stern, and thereby anticipated a Zeppelin development which was not forthcoming until several years later.

The Beginning of Vickers Aeroplanes.

It was in January, 1912, that Major Wood started the Vickers Flying School at Brooklands, the first machines to be employed being pusher biplanes of the Henri Farman type with 50-h.p. and 70-h.p. Gnome engines.

Incidentally it may be mentioned that the Vickers School proved a valuable addition to our training establishments, and that 99 pupils had passed through it up to July, 1914, prominent among them being General W. S. Brancker.

In addition to establishing the flying school, the work of aeroplane construction was formally entered upon by taking up the licence to manufacture R.E.P. engines and machines in this country. A two-seater R.E.P. monoplane was brought over from Paris, and after some alterations had been effected in its design Major Wood flew it at Brooklands.

In the Antarctic.

It was found unsuitable, and eventually the type was abandoned, but a fact of interest in this connection may be quoted here, and that was the sale of an R.E.P. monoplane to Dr. Mawson's Antarctic Expedition. The machine was broken up during a demonstration flight at Sydney before the South Polar regions were even reached, but its sphere of usefulness was not thereby ended, for it was converted into a sleigh and used as such throughout the expedition!

A British Type.

During the time, moreover, that R.E.P. machines of altered design were being produced, the firm was busy with designing on its own account, and eventually brought out the "Vickers 5."

Like all successful pioneers when looking back upon their early efforts, Major Wood can afford to smile at the recollection of this machine, which he calls a "funny old thing." It was a monoplane fitted with a British-built R.E.P. motor, which had an unhappy habit of shedding its cylinders, but was nevertheless better in performance than the French R.E.P. itself. The "Vickers 5" was used as a school machine at Brooklands for a couple of years, and though it was frequently broken and repaired, a great many pupils gained their certificates thereon.

The 1912 Trials Type.

A two-seater monoplane, with the seats side by side, was then put in for the Army Trials of 1912, and flown by the late L. F. Macdonald. It was fitted with a 70-h.p. Viale engine, and as to the latter it may be mentioned that in Major Wood's opinion it was one of the best aero-motors ever made, but, singularly enough, no one ever continued with its manufacture.

The machines entered for the Military contests had to put up a three hours' flight in the first instance, but though the Vickers flew satisfactorily for 2¾ hours, it then gave up because its tank proved too small, and no time was available either to fit a larger tank or to tune the engine up to give more economical results.

Another machine which was built about the same time was a two-seater with a 14-cylinder 100-h.p. Gnome, but though useful for school purposes it did not otherwise distinguish itself.

THE CHIEF PILOT.

One of the Viale-engined two-seaters was then fitted with an 80-h.p. Gnome, but was not a great success, and after that well-known flier, R. H. Barnwell, had had a smash on her at Brooklands she was never rebuilt.

Mr. Barnwell, it may be mentioned in passing, is still with the Vickers firm, as also are many others who went through the spade-work of the early days.

THE FIRST GUN-'BUS.

Then came the most important development in the history of Vickers aeroplane construction. Major Wood had long since come to the conclusion that "fighting in the air" was destined to be a vital feature of future warfare, and addressed himself to the task of producing gun-carrying machines.

A pusher biplane with staggered planes and enclosed nacelle, and capable of carrying a gun, was designed in 1913, and in an improved form was exhibited at the Aero Show of 1914. This was developed into the actual Vickers fighting machine, which was fitted in the first instance with a 9-cylinder 90-h.p. Gnome, and afterwards with a 100-h.p. monosoupape.

Such, in fact, was the type of machine which was being turned out at the time the war began, and of which a considerable number was supplied to the War Office.

THE "BULLET."

The "Bullet" followed, and for a time was the fastest machine in the air. She was fitted at first with a 100-h.p. Gnome, which was replaced by the 100-h.p. Clerget, of which Major Wood brought over from Paris the first example to be seen in this country.

Incidentally, it may be mentioned that he also brought over the first Hispano-Suiza.

The "Bullet" had a speed of about 120 m.p.h., and one of its noteworthy features was the fact that it was the only entirely wooden machine which Vickers Limited have ever built.

MULTIPLE ENGINES.

Three or four double Gnome machines were next produced, but this type was not continued, and a 160-h.p. Beardmore tractor followed. Further than this in the enumeration of types one must not go, owing to obvious considerations. But this much may be said, that the activity of the firm in the way of aeroplane construction since the war began has been tremendous.

MULTIFARIOUS ACTIVITIES.

Previously the Vickers machines had been built at Erith and then Crayford, with an experimental aerodrome at Joyce Green, and in September, 1915, new works were built at Weybridge, where a vigorous policy has been pursued. More recently a wind tunnel has been set up at St. Albans, and has proved of much value for experimental work.

The managing director of Vickers Limited, Sir Trevor Dawson, takes a great personal interest in aviation, and the future of the movement is regarded as so important by the firm that it has spent no less than half a million on aeroplane development in the last two years.

THE TASK BEFORE US.

Major Wood himself, it may be mentioned, was at the front with his regiment, the 9th Lancers, at the outset of the war, and is under no delusions as to the nature of the task which has to be faced in conquering the German hordes.

The recent recrudescence of enemy aggressiveness in the matter of high-powered machines of great speed he regards as a subject for the serious consideration of all concerned. His views as a practical authority on various aspects of aeroplane development, on its military and commercial sides alike, are of no small interest, and I may mention in particular that he has unbounded faith in the future of the big machine.

THE BIG AEROPLANE.

It is certain, he believes, to "make good," but we need time to study it. In Russia the Sikorsky "giants" are even used for transport purposes, but over here we have always been on the rush to build as many machines as possible to bring down the Hun, and have had little time to give to big machines.

A NEW FACTOR.

Meanwhile the production of faster and still faster machines goes on apace, and Major Wood predicts that in a year's time we shall be talking of 150 miles an hour as a normal speed, and of even 200 m.p.h. within two years. But the exigencies of warfare have produced a new factor, he points out, which even the most skilful and experienced of pilots cannot afford to ignore.

The success or otherwise of the high-speed machine is a question of hands as well as of design, and matters are now cut so fine that the stage has been reached when the dictum may be enjoined that "any pilot can smash any machine"; and "they must learn," says Major Wood, "how not to do it."

COMMERCIAL POSSIBILITIES.

The commercial possibilities of aviation Major Wood believes to be unlimited, and he regards postal and transport services as inevitable. When I remarked that both France and America were already officially projecting after-war developments in these directions, he rejoined: "And why not we also?"

The public generally, he added, do not realise to anything like an adequate degree the possibilities of aviation on the commercial side. He feared, moreover, that immediately after the war the Americans would come over with machines all ready to hand, and might possibly "wipe the floor" with us if we were not prepared to meet their competition on better terms

Consequently, so far as is possible under the present stress of circumstances, it behoves the authorities and the Aircraft Industry to bestow the most serious forethought to after-war developments.

The Heat Treatment of Steel.

By J. M. ROGERS, M.E., **Research Metallurgist, The Curtiss Aeroplane and Motor Corporation.**

(Reproduced from "Aviation," New York, Jan. 15th, 1917.)

The heat treatment of steel is of great importance in aeroplane construction. Aeroplane fittings and engine parts should be made as light as possible without impairing their strength. The steel from which they are made should therefore have the greatest possible strength and sufficient resilience to resist the shocks to which fittings or engine parts are subjected. For steel to attain the above properties, it is necessary that it receive very careful heat treatment.

The three principal reasons for heat treating are to harden and toughen the steel, and refine its structure. There is always a great deal of uncertainty as to the physical condition of steel that has not been heat treated. Several portions of a bar or forging may have been finished at different temperatures, or one bar or forging may have been finished at a higher or lower temperature than another. These conditions would cause a variation in the physical properties of the steel which would not be at all desirable.

It will also be found that the structures of steel castings and drop forgings, which have been finished at high temperatures, are very coarse. All important steel castings and drop forgings should be heat treated for the purpose of refinement, as a coarse structure greatly impairs strength and ductility. It is evident from the above statements that it is necessary to heat treat steel when the best physical properties obtainable are desired.

There are five different structures found in steel: austenite, martensite, troostite, sorbite, and pearlite. When a piece of steel is heated to a temperature above the critical range, i.e., temperature range over which the transformations of structure take place, the structure becomes austenitic and this transformation is accompanied by a refinement of grain. As the piece is slowly cooled through its critical range, there is a transformation from an austenitic to a pearlitic structure, the steel passing through the transitional structures in the order given above. The physical properties of these structures for carbon steel are given in the following table:—

Structure.	Strength in thousands of pounds per sq. in.	Ductility.	Hardness.	Resistance to shock.	Resistance to fatigue.
Austenite	150-200	30	1.5	very good	good
Martensite	?	0	4-5	very poor	very poor
Troostite	200	2-5	2	fair	very good
Sorbite	160	5-10	1.6	good	very good
Pearlite	140	10-15	1.5	good	poor
Ferrite (Pure α iron)	40	40	1	fair	fair

The completeness of this transformation depends upon the rate of cooling throughout the critical range. The transformation from austenite to martensite is very rapid, and austenite is never found in commercially heat treated steel except in the special case of austenitic alloy steels.

A high carbon steel quenched from above the critical range will contain a large percentage of martensite, but as the carbon content decreases the structure becomes troostitic or sorbitic. After quenching, there are internal stresses in the steel resulting from the rapid cooling, and it is necessary to draw, i.e., reheat the piece to a temperature below the upper limit of the critical range. in order to remove them. The higher the drawing temperature, the greater is the tendency for the steel to become

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pearlitic, and by properly choosing the drawing temperature, any desired completeness of this transformation may be obtained.

The physical properties of steel may be greatly improved by the addition of certain elements. Nickel, chromium, and vanadium are used to a great extent. The steels to which these elements have been added are known as alloy steels. Nickel increases the hardness, toughness, and tensile strength, with only a slight decrease in ductility; chromium imparts great hardness; and vanadium gives a very good combination of strength and toughness. All of the above elements increase the elastic ratio. Alloy steels can be greatly improved by heat treating.

The determination of the proper quenching temperature is of great importance. The steel must be heated sufficiently above the critical range to refine the structure and give the maximum rate of cooling on quenching as the temperature passes through the critical range. The location of the critical range can be determined from a thermal curve, and usually can be obtained from the manufacturer of the steel.

The question as to how far above the critical range the quenching temperature should be depends upon a number of considerations. There is a tendency for the crystals to grow when the steel is heated above its critical range, and the rapidity of this growth increases with the temperature. Therefore it is not desirable to heat the steel any more above the critical range than necessary, or to hold it at that temperature any longer than necessary.

If the grain of a piece of steel is very coarse, it is necessary to heat it considerably above the critical range to refine the steel, but the resulting structure will not be as fine as it would have been had the structure been finer at the start. This difficulty may be overcome by heating the piece sufficiently to refine it, then cooling slowly or rapidly, and reheating slightly above the critical range, and finally quenching.

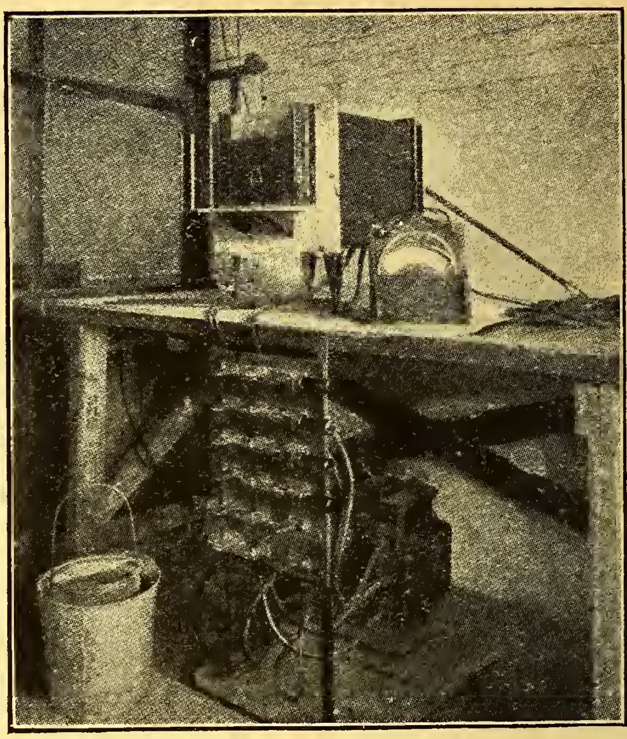
The size of the piece and the temperature drop between the furnace and the quenching bath are important considerations in determining the proper quenching temperature. In heating a piece of steel to its quenching temperature, the furnace temperature should be brought up slowly enough to give a uniform heat, and the piece should be permitted to soak at the quenching temperature for a few minutes only. The temperature of the quenching medium should not be permitted to vary suffciently to appreciably affect its quenching speed. There are quenching oils which will give uniform quenching speeds over large temperature variations.

Steel is drawn after quenching in order to remove any strains resulting from the rapid cooling, and to toughen it if it has been made too brittle. The time of drawing depends upon the size of the piece, a longer time being required for larger pieces. A salt bath is very satisfactory for drawing at low temperatures.

The successful heat treating of steel depends a great deal upon the furnace man and the equipment with which he has to work. He must be able to regulate his furnaces accurately; use his judgment as to whether the steel is up to furnace temperature; and look after a number of small details, such as the arrangement of the steel in the furnace, the method of quenching, the location of the pyrometer fire iron in the furnace, etc.

The furnaces should be so constructed as to give uniform heats and absolute temperature regulation. An accurate pyrometer is absolutely essential. The potentiometer and high resistance types of pyrometers are most accurate, and it is quite important that they be compensating for cold end corrections.

It is quite important that there be a constant check kept upon the heat treated products, by making physical tests and microscopic examinations of the structure. In this way any irregularities in physical properties and structure are immediately detected. To obtain a uniform heat treated product, it is very important that there should be no appreciable variations in the chemical composition of the steel, and frequent chemical analyses should be made to detect any such variations.



This photograph shows a Hoskins electric furnace which is used for experimental heat treating. The muffle is 7⅜ inches wide, 5 inches high, and 12 inches deep. The furnace is of the resistance type, and the current is regulated by a regulating transformer. By manipulation of the switchboard, the secondary voltage can be varied by steps of one volt, from 1 to 45 volts. This makes possible very accurate temperature regulations up to 2,000 deg. F. The furnace temperature is measured by a resistance-type pyrometer, the fire iron to which it is connected being inserted into the muffle at the back of the furnace. This furnace has been found to give very uniform heats.

A General Purpose Motor.

Long and long ago before the war, British motoring rather than its motor-industry suffered from the need of stock motors of the highest grade perhaps more than from anything else it lacked. On the other hand, the motor-industrials—some of the biggest and best-placed at motor-car shows—suffered mostly from three things.

One was the very laudable, but expensive, ambition to build an entire car under one connected set of roofs. Which connotes a huge capital, a highly efficient staff from designers down to duty-boys, a super-efficient system, and an assured market. Also, knowing how.

The second was not knowing how. Which might have been excused to the precluding beginnings of some of them.

And the third and inexcusable thing was that they mostly had British palsy, or micro-palæozootic heart-disease. Which is not the Harley Street or Tribunal kind, but the ancient trouble which makes one too rotten-hearted to pay good men who do know how enough to keep them, even to half what their service is really worth.

So these men went to America—where they argue that the more you earn for yourself the more you are earning for the business—and presently created the American motor-industry. Hence those tinkly Temple bells of alarm and warning.

Motor Assembly.

However, as nobody knew anything about the *systême globale*—which is *not* a new sort of fish-balls, but the soul and secret of cheap, intensive, rapid, and reliable automobile production—and as road-racing was whole wickedness, certain results happened, being duly asked for.

One was that the average "all-British" car remained a more or less elegant counterfeit, too slow to get out of its own way, and as expensive as a revue. While the *pur-sang*, circuit-bred foreigner, or even the assembled mongrel, lost it every time for car-quality. Another was that there was little or no demand for the high-grade stock motor. And the third, that it did not come along.

So British motoring remained expensive, if only on the production behind it, and very much behind its needs. To say nothing of perpetual persecutions, penalisations and ring-fenced petrol. All of which was bad for British motoring.

Commercial Necessities.

After a time, however, certain firms who did not deal solely with the Almanach de Gotha, but occasionally sold a car to a humble British peer or commoner, or whose shareholders demanded dividends or liquidation, began to put their motor-production out to specialists. Sometimes they furnished the drawings Even to the pattern of the name-plate.

So that the production still remained "our motor." Twin-sister to the one on the next stand. That was why the process was called standardisation in the show reports. You noticed it more than ever in the gallery—where the car-buying public never went—among the foundry exhibits of accented persons whom nobody ever heard of. Then you learnt the difference between castings and catalogues. The former tell no lies.

About this time the British car began to cheer up and win races and hill-climbs. Of course, their motors may have been original creations to a cam-contour. But it is a singular fact

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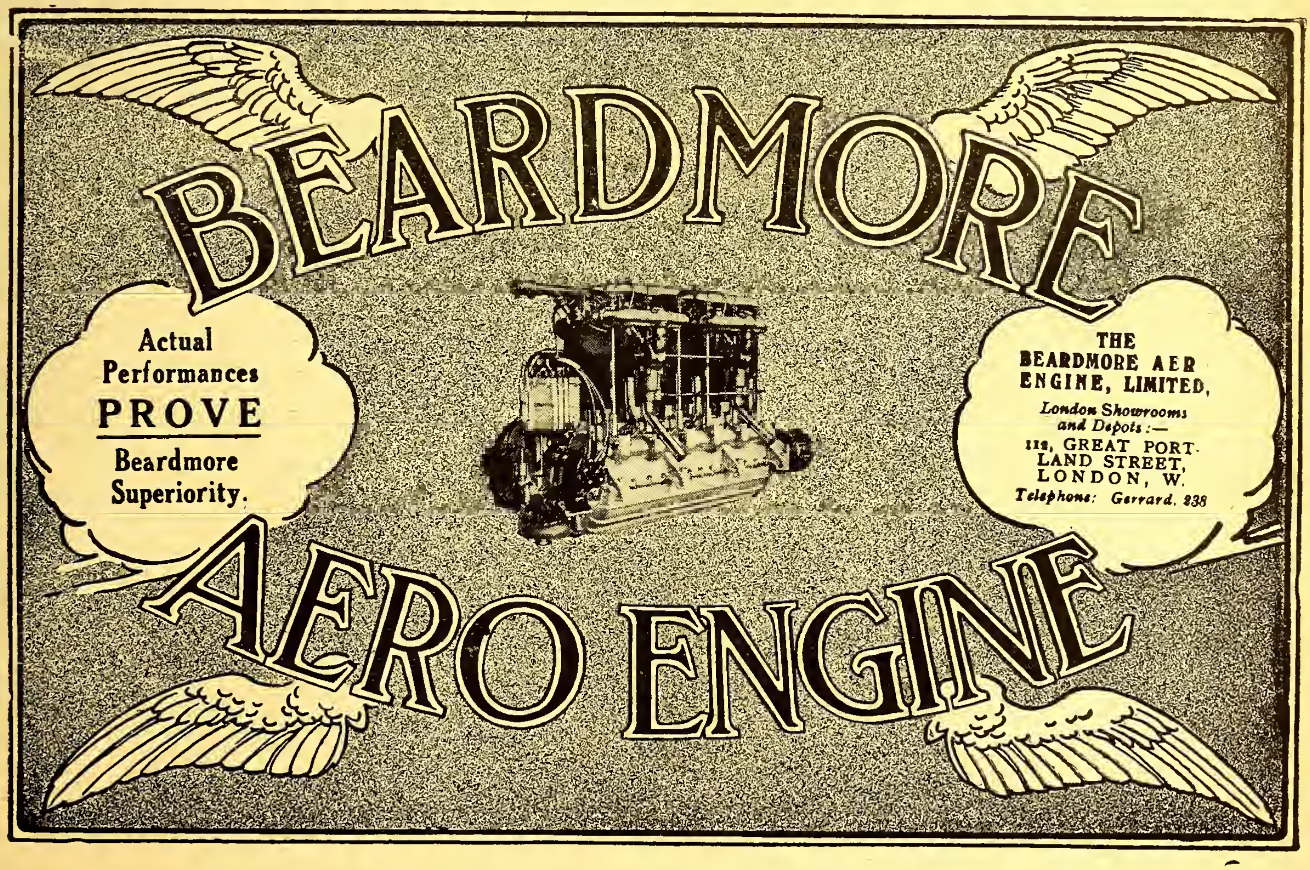

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AERO ENGINE

that at Brooklands, when unbonneted, you could trace family likenesses back to the foundry, easier than you could the get of Blacklock or The Baron . . . elsewhere of old. So that, after the sixth or seventh "record" had been achieved one used to wander over the blasted heath to the aero-village in the hope of discovering something new.

Not that motor-racing and motors did not improve. They were bound to, considering who really bred so many of them. After a while, too, these breeders even began to make themselves very quietly known to the motoring public, without exactly shouting their great merits.

War Products.

Then, on the day of the very last meeting at Brooklands, came the blast of war to blow all British shams and snobberies to the four winds. Since which time, we have so much learnt the surpassing worth of the fundamental truth, sound workmanship and the clean deal, and the utter worthlessness of anything else in business and industry, that it is quite possible, after the war, that even a motor-car assemblist will have the wit to advertise his clever combination of Smith's motor, Brown's gear-box, Jones' chassis and Robinson's transmission, and take pride therein. Then Smith, Brown, Jones and Robinson will more or less come to their own. Which will be very good for the British motor industry. Also for motoring, because united effort to produce the best will make it far cheaper.

It is quite likely that the car-owner will proclaim his specialist-produced motor. And it is quite certain that the urgent needs of commercial motor transport will demand these stock-type motors of the highest grade. A chassis for such a load, therefore needing so much power, on the one hand. There, on the other, the motor of known quality and known over-all measurements. Combine accordingly.

A Stock Motor Proposition.

One of these motors—exceptionally so—is the 25-h.p. four-cylinder J. U. model made by W. H. Dorman and Co., Ltd., of Stafford. Chiefly because its design embodies practically every point that racing has developed, combined with the staunchest detail construction, and the greatest simplicity obtainable in the four-stroke cycle. So that the "not-needing-to-know-what-goes-on-under-the-bonnet" idea is as nearly as possible attained.

Here we have racing practice—and the high r.p.m. rate which has been found of even more advantage in commercial than car-motoring, because the greater flexibility permits a wider range of gearing for a greater load-variation—shown in the bore and stroke proportions of 95 mm. and 140 mm.; which while giving 3970 c.c. of volume—and all the h.p. that can be got out of it—shows an R.A.C. rating of no more than 22.4.

We see compactness in the monoblock casting of two pairs of twinned cylinders; each in a pair being just united to the next at one point of a common wall; so that they shall nevertheless be equally cooled, while mutually stiffened and less free to distort under heat or strain, thus tending to prevent ovalisation.

Simplicity and Skill.

There, too, is simplicity in the casting of the induction passage along the valve side; behind, and uniform with the guides, yet always well surrounded by warm water: thus making for economical petrol consumption; the main induction entry running in between the cylinder pairs from the opposite side.

Note that the intermediate spacing thus created gives room below for a wide central bearing for both shafts, and for a grooving—in the case of the cam-shaft—for a direct oil-feed.

Then remark the exhaust manifold, cast upwardly in the form of a gilled-chamber; judiciously formed as the one loose part, and thus clamp-attached, so as to allow for expansion when hot.

Notice, again, the unusually long end-bearings; and therewith the main oilways cast in the crank-chamber metal with leads to each bearing. Also the diagonally set oil pump rotated by a spirally geared spindle from the rear end of the cam-shaft. A small but special point here is that this diagonal tilting of the pump itself at the bottom of the sump always gives it command of the last drop of oil that may remain. However, in connection with this oil-pit there is a vertical float-chamber containing a tell-tale to show the quantity of oil contained. So while there is nothing to do but pour the oil in, there remains no excuse for either under or over-lubrication.

Finally, we notice not only the simple thermo-syphonic cooling which, given well-calculated areas is the least likely to give trouble and, for the variation of road-work, gives the better all-round thermal efficiency; the next encasement of the valves by a single attachment panel; the ample gear-encasement enclosing the half-time and all supplementary gears, such as that of the accessibly placed magneto and the adjustable fan, and the nakedness and accessibility of the entire design.

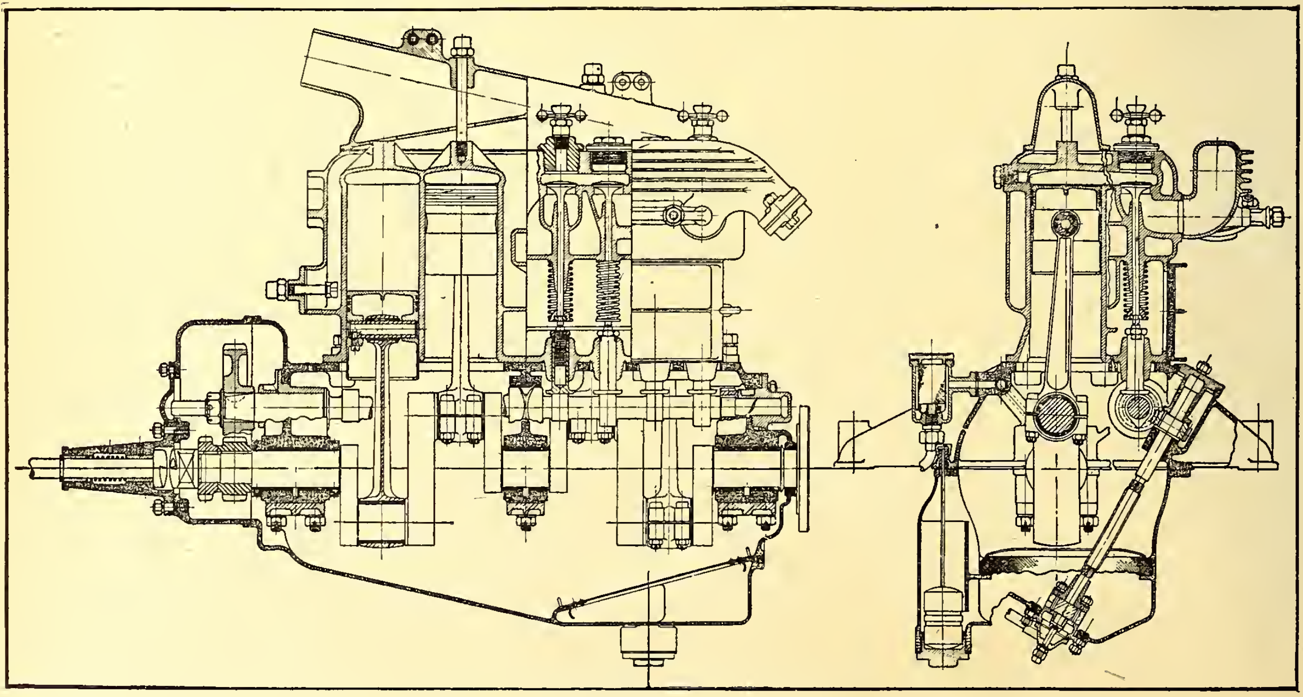
Considering, too, that the Dorman motor is designed to run on petrol or paraffin, it is hard to imagine a better for general purposes.—G. de H.-S.

ZEPPELINS AS WORKING PROPOSITIONS.

It was reported from Zurich, on Jan. 30th, that, according to information received from Berlin, great consternation has been caused in German Parliamentary circles by the news which recently leaked out that the aerial experts of the Great General Staff have advised the Minister of War not to construct any more Zeppelin airships for the army.

At the same time, it has become known that the advisers on aerial matters to the Naval Staff also advised, some time ago, that Zeppelin airships should be used only for scouting, and not at all, or only secondarily, for attacks on enemy countries or enemy fleets. Both groups of experts based their recommendations on the argument that practical experience has revealed great defects in the Zeppelin airship. It is condemned as being too unwieldy, too susceptible to weather, and altogether too vulnerable.

[This is possibly true. At the same time, it will be well for us to remain vigilantly on guard against aerial invasion, for the wily Hun is quite capable of circulating reports of this kind in the endeavour to put our Home Defence Forces off their guard. And, in any case, if airships are condemned as an invading force, it is quite likely that aeroplanes may be used instead, in which case, still greater vigilance will be necessary.—Ed.]



The Dorman General Purpose Motor, 25 h.p., 95 by 140 mm.

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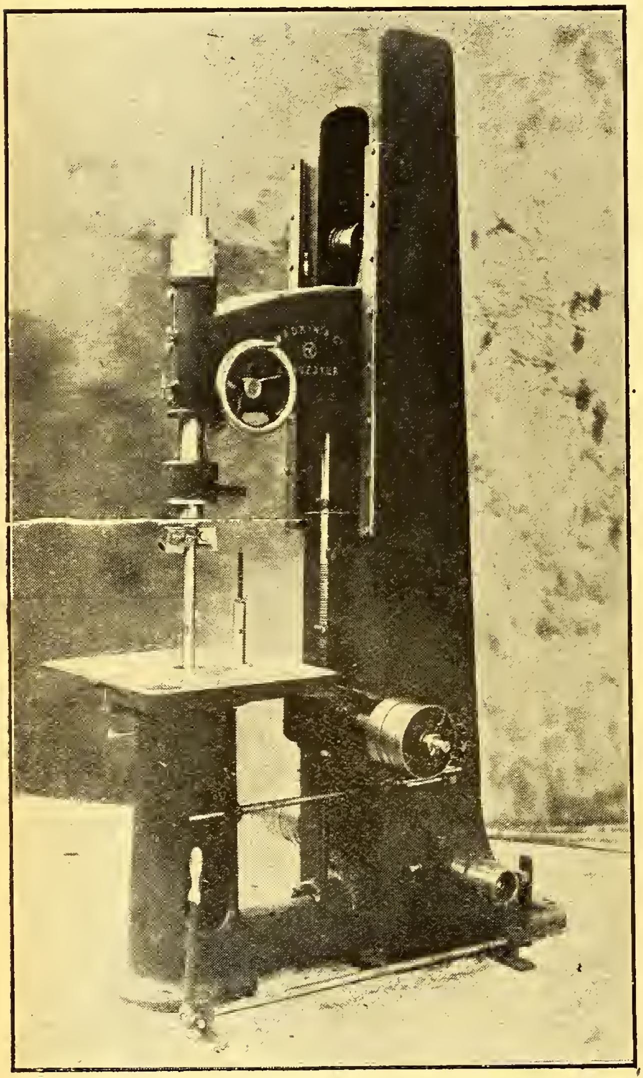
A NEW PROPELLER BORING AND RECESSING MACHINE.

The machine illustrated has been designed specially by Messrs. Wadkin and Co. to meet the great demand from propeller makers for a machine to bore propellers with extreme accuracy. After numerous experiments with ordinary boring and recessing machines, it was found that a special machine designed on the vertical boring bar principle was the only reliable method of obtaining a dead parallel hole of the necessary length.

The boring bar is mounted in a No. 4 Morse taper chuck, and has a screwed end which ensures the bar being drawn up quite tight and dead central. The bar is slotted to take a plain fly cutter, and an adjustable recessing cutter block is screwed to the bar in a position dependent on the depth of the propeller hub. By this means the recessing and boring are accomplished at the same time without the necessity of changing tools. The spindle carrying the boring bar is mounted on ball bearings of extra heavy type and carried by a balanced sliding sleeve.



The Wadkin Boring and Recessing Machine.

The opposite end of the boring bar runs in a bush which is carried in a ball-bearing housing recessed into the table. A positive stop is provided for regulating the exact depth of recess in the propeller.

The overhanging arm carrying the spindle is raised and lowered by power controlled by hand lever at the front of the table. This provides a quick and easy means of setting and withdrawing the boring bar for each propeller. The actual cutting operations are accomplished by means of rack and pinion motion controlling the sliding sleeve.

The machine is entirely self-contained, and the main spindle is driven by a single belt running inside the main frame from a countershaft fixed to the base of the machine. The drive is so arranged that a constant tension is retained irrespective of the position of the sliding arm. For ordinary recessing, trenching, shaping, etc., as met with in aircraft construction, a compound table is provided, and the machine thus equipped is an ideal tool for halving in the case of three- and four-bladed propellers.

The makers, Messrs. Wadkin and Co., of North Evington, Leicester, will be pleased to answer all inquiries.

[Reproduced from the "B.P.," the house magazine of Boulton and Paul, Ltd., of Norwich.]

My Darling Jack,—I don't know if you see the papers—I expect you don't have your evening "Star" quite regularly—so perhaps you missed that bit about people giving up washing in war-time, and saving the money they would have spent. Sounds funny, doesn't it? I don't mean that people are to give up washing themselves, but they are to have fewer clothes washed. I don't like the sound of that. Of course, if people who know all about these things tell us that it is for the good of the country that we are not to have a clean blouse when we want one, I suppose that there isn't a girl here who would complain. But I don't believe it has come to that yet.

One of the girls who knows what is going on at the front—so she says—tells me that you get all the washing you want this weather. I said to her: How's that? She said that it was raining most of the time and so water was plentiful. I asked her if she would like washing in mud, and then she went on with her work.

Another girl who has a brother somewhere in France was crazy with joy at Christmas because he was able to have leave. I have heard lots of the news, but I don't suppose it's news to

At the Fitter's Bench.

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One of the Welders.

you. She said that her brother told her that every nurse at the front had earned the Victoria Cross many times over. This boy said he had often seen a nurse kneel down on the road and break the ice in a cart rut to get a little water to wash her face. That doesn't look as though you had too much water, does it, Jack?

The other day we had a discussion as to which work here was the prettiest. I think the prize was given to the other works—the metal shop. For some things I rather wish I had taken that up. It looks dangerous, but you may be quite sure that every care is taken to prevent any of the girls getting hurt. The prettiest job of all is the welding with acetylene gas. The girls have to wear shades to protect their eyes from the fireworks, as we call them. There is one little bit of the welders' work which we call "fork and bloaters," but the smell is a bit different!

Is metal work more difficult than wood? It looks to be so to me, but I expect that is because I don't understand it. Our job—the one we are used to—is always the simplest thing in the world, isn't it? When I first came here I never thought they would make a carpenter of me, but a carpenter I am, although I don't think I am honoured with the name. Wood-worker doesn't sound quite so classy and mannish, does it? But that's what I am. Well, after all, it's the oldest work in the world, I should think. Man must have worked with wood long before we knew anything about metals. After all, what does it matter what we are called or what we do so long as we are doing our bit to help to win the war?

You hear some funny things about what is going to happen after the war. The other day we were chipping one of the girls about getting the sack soon, because of all this talk about peace. She said that we should all go on working just the same after the war for a very long time. We asked her how long. She said she had heard from a man who has a first cousin who is nearly related to a girl who is engaegd to some man who does something at the War Office—or some other office near it—that when the war is over England is going on working for the next war, and means to have sufficient supplies of everything ready for twelve years! She didn't like it because we laughed at her; in fact, she got very cross for the whole of the morning. I don't like a girl who can't stand being laughed at. That sort of girl is generally the first to start having a game with some newcomer who doesn't understand her job. I like a girl who will laugh with you when you are laughing at her. See what I mean? I expect you feel the same thing about men. I was told a long time ago that a man who can't stand a joke can't stand very much, and I expect it's still true.

I heard a story of one of the girls' brothers the other day. I should think he must be one of the right sort. (Now don't be jealous, darling; I've never seen him, but I've seen his wife and their boy—and a cheeky little imp he is.) This man is doing something with the motor transport out with you. One day he had to go to a hospital about his teeth. The authorities sent a car seven miles to fetch him to the hospital, but after he had had his teeth out there was no car to take him back to his place, and he had to trudge the seven miles. He told his wife that although he was feeling pretty bad he couldn't help laughing at the idea of giving him a ride when he wasn't particularly bad, and making him walk when he would gladly have had a ride. It makes some of us feel very small — that sort of thing. How some of these girls can make a fuss about a little scratch on their finger when they must know that their men are roughing it as they never roughed it before, I don't know. Seems silly to me. Besides, if a girl does happen to cut her thumb when she ought to be cutting a bit of wood, whose fault is that? I've no patience with girls who grouse and grumble at every little trouble these times. I don't suppose that you and your pals grumble at having to be up to your waists in mud—as I am told you often are.

It seems to me that anyone who grumbles is wrong all round. It doesn't matter how you look at it. If the thing about which you grumble can't be helped, what's the good of grumbling about it? That won't help matters. Much better laugh at your worries than pull a long face over them. If the thing you are grumbling about can be helped, then it is up to you to put it right—if you want it put right. You can do that instead of grousing about it, so either way the grumbler is in the wrong.

Good old Norwich is much as usual. If you were to see how busy we all are, you wouldn't think that the authorities here had a mind for peace just yet. When you get your leave you won't stop to clean your boots before you catch the train, will you? We'll manage that for you here, and be proud to do it.

A Casualty.

Good-bye for a little time, you old darling. All my love.

Ever your devoted, ———

OFFICIAL APPOINTMENTS IN THE U.S.A.

The Bureau of Construction and Repair of the Navy Department has started the new year by expanding its technical staff. Chief Constructor D. W. Taylor now has as his assistants, whose time is entirely devoted to aeronautics, the following:—

Naval Constructor Richardson, at Pensacola, in charge of experimental building, repair and maintenance of aircraft at that station.

Naval Constructor Westervelt, at Buffalo, "Superintending Constructor of Aircraft," who is to control the inspection of aircraft built on contract and to represent the Bureau in the field.

Assistant Naval Constructor Hunsaker, at Washington, assistant to the chief constructor, in charge of design specifications and contracts.

Dr. A. F. Zahm, at Washington, in charge of wind tunnel experiments and on research work of the Bureau.

AN INTERESTING APPOINTMENT.

It is with pleasure that one announces the appointment of Mr. R. S. Hubbard to the post of General Manager of Handley Page, Ltd. Mr. Hubbard, though little known to the Aircraft Industry in the South of England, is already well and favourably known in the North as late manager of the Aviation Department of Beardmore's, Ltd., where he has had experience of building the biggest seaplanes and the smallest scouts, as well as intermediate sizes such as B.Es., so that he has had precisely the right graduation of experience for the Handley Page Giants.

It is all to the good that Mr. Hubbard has had wide experience of the best kinds of engineering. After serving many years with the famous Fairfield Engineering and Shipbuilding Co. on the Clyde, building battleships, he went to America, where he joined the builders of the Holland submarines as a naval architect. Thence he went to Japan, where he supervised the construction of submarines in a Government dockyard.

The evolution of his experience from battleships to submarines and thence to aircraft should prove of very high value to his new firm, and the combination of his engineering workshop knowledge with Mr. Page's long experience of aircraft should add greatly to the strength of Handley Page, Ltd.

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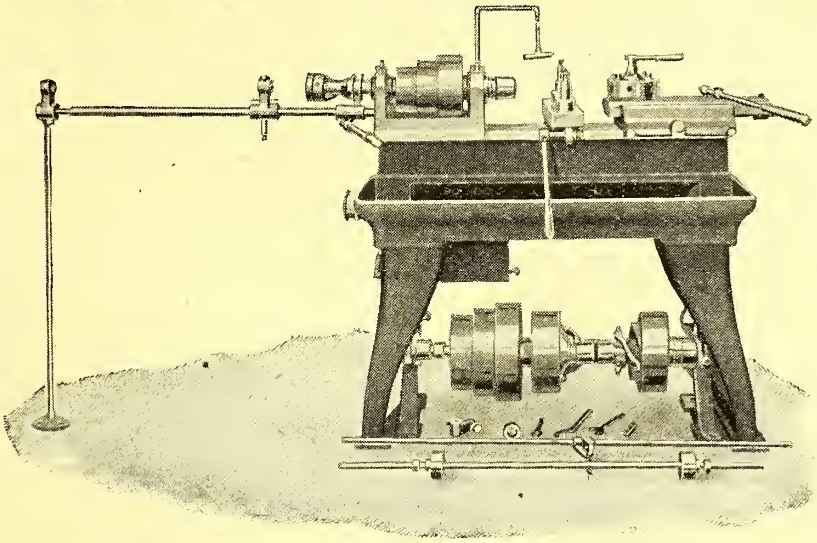

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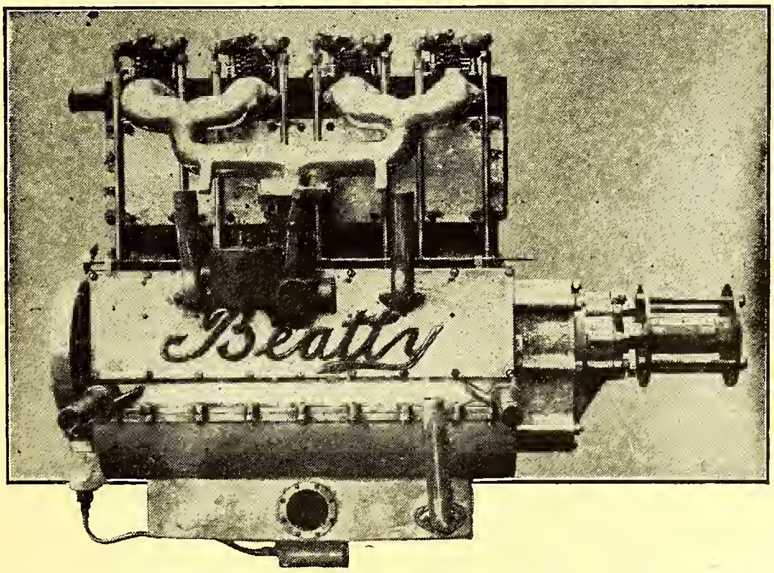

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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

1916 IN REVIEW.

THAT AMERICAN SPIRIT.

"· · · · *He knows not much what I am like,*
Nor what he is, my avatar."

Neither Fifth Avenue nor Newport, R.I., need to be told why brown boots and a bowler, though each good of their kind, do not exactly befit a morning coat. Nor does Los Angeles, Cal., from the evidence of the films. Nor does their backwash anywhere in America. But none of them really count, except as customers. On the other hand, the great Common Man of America, who goes every day to the foundry or the roundhouse, the shops or the yards, at so many dollars until he "makes good" and gets more dollars and finally becomes a president or a corporation, and occasionally meanwhile designs motors among other things, does seem to need to know.

That is, if you may judge from the said motors.

He being a man, sees no ethical reason why not. Nor do I, as another. Nor does anybody but a valet. The only difference between us is that I—for the moment assuming to stand for European ideas—do perceive æsthetic reasons: which in this matter of motor design happen to be practical, and are therefore quite good and sufficient.

A COMPLETE ANATOMY.

For a motor—especially an aero-motor—according to these ideas, must be a complete anatomy, a Conception whole and entire, if it is to be any good. Everything must belong and blend. So that you cannot see where the design-scheme began or left off. Nothing must camp on sufferance anywhere. Nothing must enter that scheme, nor be used for any other reason than that it is inevitably appropriate. Never because it just happens to be the latest thing.

We poor played-out Europeans somehow do take an unhurried leisure to achieve a conception of sorts, pure and unmixed, according to our grey lights. With rare exceptions, the hustled arc-light American apparently cannot. He guesses he has no time. Missing his guess unto damnation every time. And he has just got to have the latest notion and then kill everything else trying to make it fit in. That is why the product also usually remains the latest; that is, all behind.

WIT AND GENIUS.

Not that he cannot organise and produce generously enough. He has the saving wit to afford to. We have not, and so cannot. But wit is not genius. Not that he cannot invent and often improve; but he mostly fails to select or adapt. Therefore—with exceptions—the best he produces is only the straight copy of the design of some Englishman or lazier Latin, or an occasional Dutchman, who is the real brain of his business, but seldom the chief stockholder. His own unrestrained, independent attempt is mostly an ungodly patchwork, that just works, nevertheless.

But truly—unless it were our own natural-adopted S. F. Cody—there have been few real Americans since Robert E. Lee and Ulysses Grant, Charles Sumner and Abraham Lincoln—all men who would not be hurried—and their generation, that knew not the butcher Roosevelt and his half-baked gospel of strenuousness. There seems to be only the American spirit waiting renewed embodiment in a South cleansed of ancient ills.

A HOPEFUL SPIRIT.

It is a hopeful spirit and a strong. So much so, that when it becomes sincere, it will surely be greatly realised, grandly embodied. But for that sake—and one may still judge the faith of a nation by its works—I will not pretend to see a sincerity that is not yet apparent in the craft-result; at any rate, not in the average American aero-motor. I see nothing patient or laborious, enduring or discarding for discontent about it. Nothing that would have carved as much as a corbel of Amiens. Only an intense hurry to "make good"—that is, dollars—too soon. Out of which comes nothing great.

One hears great stories of wholesale scrappings of plant and machinery in America; continual jeers at our British slowness to do the same. Also that atheism of "not building to last." Scrap the outworn and obsolete, say I, by all means, if it is to produce the better thing, or even the cheaper, that is as good. But if it is merely to produce the cheaper and the more, of the common and frail and untrustworthy; if your ideal is not the worth and beauty of what you make, but merely to increase the number and size of your nation's dump-heaps, I can only say it is not yet Europe's nor mine: and I need not even wish your trade to hell. In that case, I would not even pay you the compliment of a tariff, but that I like to see the doorways of our trade kept clean.

MEANING WELL.

Yet truly I believe American designers and motor industrials mean better than that. Would only that their intention were more apparent in the massed result. For it is because I so realise the shortcomings of European aero-motor design and production—except in faithfulness and the refinement born of sincerity—on the one hand, and on the other, the more favourable conditions that exist on the other side of the Atlantic—especially since the war—that in reviewing the outcome of 1915 as well as 1916, I am the more disappointed with the American achievement.

We in Europe have been driven to sheer output of what we had. If we got in some tiny detail improvement, it was all we could hope to do. Bound—if so fortunate—to contract and specification, it was as much as we could do to obtain material and machinery to fulfil. We might just call our souls our own. We might not call our works—not a corner of them—anybody's but the Government's, or its young men's. In whose presence it was not too safe to express our ideas or projects.

OPEN OPPORTUNITY.

American motor-industrials, on the other hand, had every opportunity for experiment and research: even for the quiet development of European ideas for which American patents existed. Of which there must have been scores. Yet what European patentee can signal even an approach for a licence for his American rights? In spite of a fairly close touch with such affairs, I have heard of but one in this country.

Then—because a four-stroke motor, as such, will mostly run the greatest scope existed, and still exists—for its improvement. It is not too much to say that so far from being even half-way towards perfection, the possibilities of its very cycle are not yet half exploited. No such radical, yet practical variation of this cycle as the Gnome monosoupape represents, for instance, has appeared for many years. But it is only one. There are many others, which have only to be suggested, to appear no less obvious—especially for aerial work—if that could be done without breaking confidence.

Yet where is a single example of such a development in American aeromotor practice? One has had the privilege during the last eighteen months or so, of reviewing several excellent detail refinements, a pump disposition and such-like; a valve gear, or some other matter of treatment; and several remarkably good, if nowhere novel, complete designs. For which, I trust every credit was given; one always tries to see better behind anything than it shows in cold daylight. But none were more than variations of current, not to say venerable, practice.

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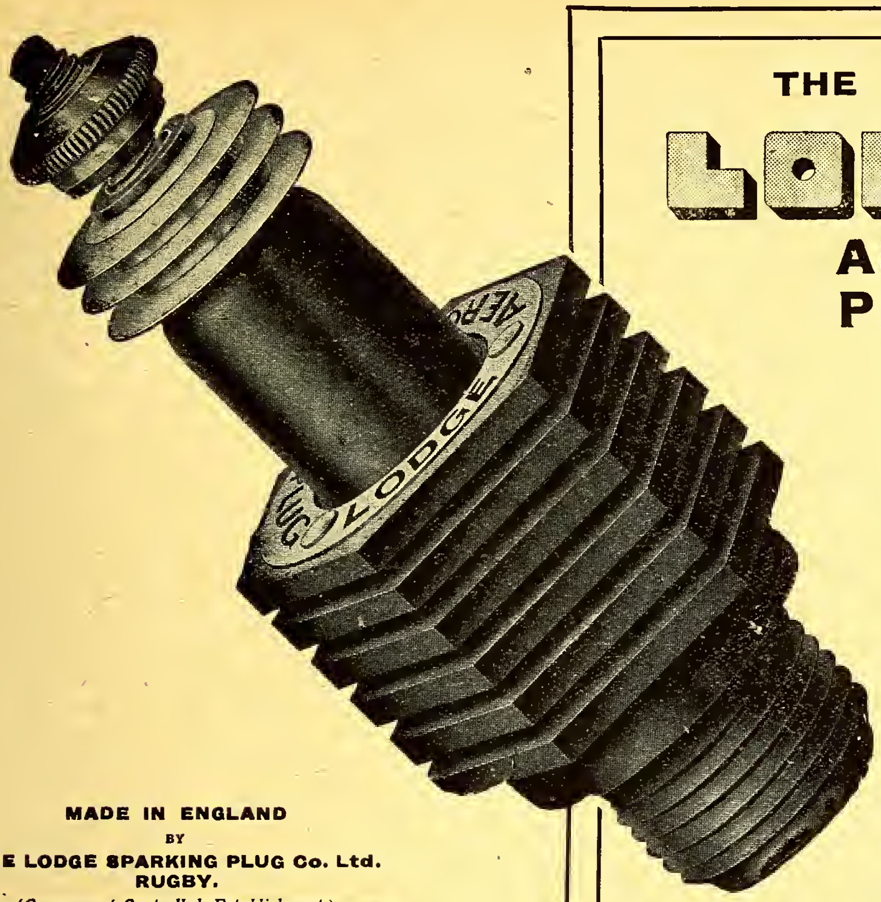

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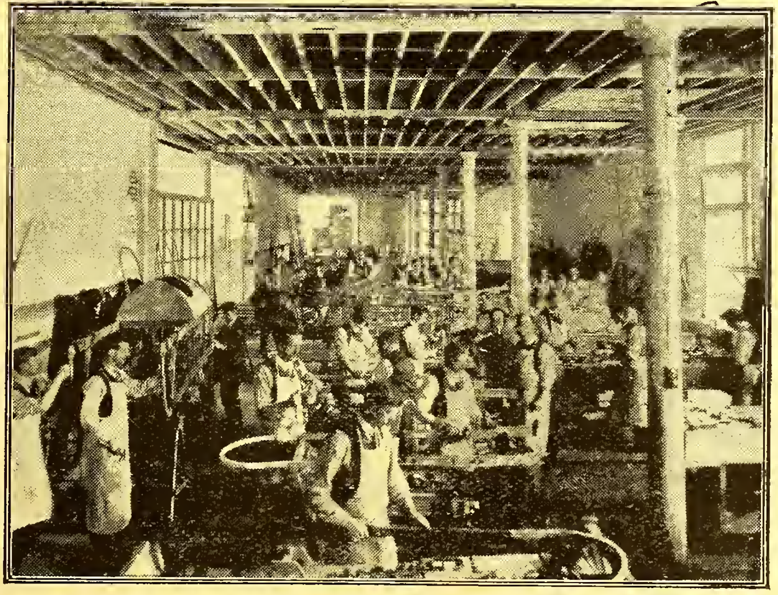

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On s'ennuie de toujours perdrix, even if stuffed with a kipper to make him an imitation grouse.

Only just in the last months of 1916 has a solitary American aero-motor been produced embodying the belted *echappement anticipè* which was a feature of the J. H. Adams V motor of nine years ago: itself only an improvement—albeit a valuable one—of Georges Ville's and I daresay a dozen others, of years before. And with so much of really new and true that might be done! Where, again, is anything like the Itala rotary unit-valve; called for in aero-motor use, if anything for silence and durability's sake ever was?

Even the "shore-haul" circuit-induction manifold which is such an excellent feature of several American aero-motors—though seen on none of our own at the moment, I will admit—is only a Wolseley idea of five years ago.

Two Strokes.

Again, none have had a longer experience of two-stroke motors than the Americans: albeit in the Day-cycle chiefly. Yet out of some twenty American makes, none embodies the slightest change from that model. We, in the past five years, have developed five—apart from the Côte and the Koechlin in France, older still—and two of these are children of the war, legitimately if secretly begotten; and able to run from earliest infancy. Which is something to say, as infants of the two-stroke breed are either marvels or hopelessly imbecile.

Horizontal Opposed.

One must, however, give one American concern—the Ashmusen Motor Company—the credit for having recognised the extreme potential value of the Sintz idea of the horizontal opposed type, and producing that idea in excellent shape. The French had the Accle as good, but have never taken it on, as it needed a bigger aeroplane than existed, and developed three times more power than was required in the days when the Darracq, the Dutheil Chalmers, and the Clément sufficed. We have had, since a little while before the war, the Werry eight-cylinder model, but have not had the wit to take advantage of it so far.

In the rare revolving type, too, America has produced one, the six-cylinder Macomber. But apart from the fact that its motion is a mere "wobble-gear," it cannot be compared with the twelve-cylinder Parker for one moment in any detail of design.

Turbines.

Again, in turbine propositions, the Detroit is distinctly original, a Conception truly, and so far extremely interesting. It appeared to show nothing to prevent it running. Precisely as its makers claimed that it does. Frankly, however, I should doubt its efficiency over an ordinary rotary, despite all the claims made. You see, if stator and rotor blades are alike external to their bodies, you can have reaction *or* impulse. Whereas you cannot have both—as these makers claimed—and the consequent efficiency of a continuous working moment of the fluid pressure medium, unless stator and rotor blades are opposed to, and practically imposed upon, each other respectively, with the slightest of clearances. Which is the case, I believe, with only one turbine in the world. Not for internal combustion. And it is certainly not the case with the Detroit. Originality is ever interesting, only less so when it is American than when it is Teutonic, because of its rarity. But in Europe we are ready to sacrifice even originality and the entertainment of catalogue literature to working efficiency.

On this side, on the other hand, 1915-1916 have at least brought forth two distinct i.c. turbine propositions, now in development. They are both much alike in details that do not greatly matter, and in any case would be questionable patent-matter. Each also represents not only a single cycle, comprising nevertheless induction, compression, firing-stroke and exhaust just as all i.c. motors must, but gives two effective working strokes of 120 degrees—or 30 degrees beyond the possibility of any reciprocating proposition—per shaft revolution, which is a promising beginning. Otherwise in those details that do matter, mechanical, physical, and patentable—of which there be a great many—they are very distinct. As will be appreciated when it is said that one has valves, while the other has none at all. Therefore one is inclined to prefer the chances of the latter. On principle and prejudice merely, considering the probable r.p.m. of a turbine, and the effect thereof on valves. Some flutter!

(To be continued.)

WAR SAVINGS.

The War Savings movement has apparently spread extensively among Leeds munition firms, and one of the best records achieved in this movement has been made by the War Savings Committee formed at the Leeds works of the Blackburn Aeroplane and Motor Co., Ltd., the membership of which has reached nearly four figures. The weekly subscriptions have increased steadily, starting with the first week of £175, and reaching in the last week of January to £250.

At the time of going to press it was expected that the current week would reach a record of £500 as a result of the special War Loan Campaign.

FOR WAR WORK ONLY.

The Lodge Sparking Plug Co., Ltd., announce that in future the whole output of their factory will be reserved for urgent national requirements, and that, therefore, it will be impossible to supply Lodge Plugs except to orders accompanied by munitions of war certificates Class A. or Class B.

The temporary disappearance of new Lodge Sparking Plugs from the cylinders of private owners is much to be regretted, but there is no doubt this new sacrifice will be accepted with philosophy, especially as all old Lodge plugs will probably outlast the war.

Probably the most notable result will be the return to the use of Lodge Plugs, as soon as conditions permit, with even more enthusiasm than they were purchased in the past.

STRAIGHT FACTS ABOUT WELDING.

An interesting 20-page folder, entitled "Straight Facts about Welding," has been published by Barimar, Ltd., the author being Mr. C. W. Brett, the managing director of the firm.

In this brochure Mr. Brett traces the rise of a comparatively new industry, which, in the early days, was gradually brought to perfection largely in connection with motor repairs.

In a series of short illustrated sketches, Mr. Brett shows how apparently hopeless fractures in almost every kind of metal have been made good by Barimar experts, until it was impossible to tell whether the smashed part was old or new. The motor user in these difficult days is often at a loss to know how he can keep the wheels running, but a perusal of Barimar's booklet will leave him in no doubt as to how to proceed. Copies are sent post free on application to Barimar, Ltd., 10, Poland Street, W.

New Patents.

This list is specially compiled for The Aeroplane by Messrs. Rayner and Co., Registered Patent Agents, of 5, Chancery Lane, London, from whom all information relating to Patents, Designs, Trade Marks, etc., can be obtained gratuitously.

Latest Patent Applications.

2036. R. O. Blayney. Flying Machines. 10/2/17.
1999. T. Brough. Aeroplanes. 9/2/16.
1942. Patent Corporation. Flying Machines. 8/2/17.
1800. A. V. Roe. Landing gear for aeroplanes. 5/2/17.

Specifications Published this Week.

103,789. Coir Tyre Co. and G. D. Rose. Manufacture of propellers, propeller blades, and parts of aircraft, and the like.

Latest Published Abstracts.

102,692. Aeroplanes, etc. J. S. Phillips, 28, Titchborne Street, Cambridge Square, London.

The planes of an aeroplane or hydro-aeroplane having multiple supporting planes are so arranged and braced that they form a structure having one or more of the planes in compression and the planes above and below them in tension. An aeroplane having a plane carrying flat forwardly sloping partitions and end pieces, between which wires are stretched for supporting central planes and triangular end planes. The plane is therefore in compression. The partitions are braced by wires to the corners of a fuselage, which is built up of longerons and diagonal pieces, and covered with three-ply wood or sheet metal. In a hydro-aeroplane, the planes are arranged wholly above the fuselage, two sets having their partitions arranged in Λ form being used.

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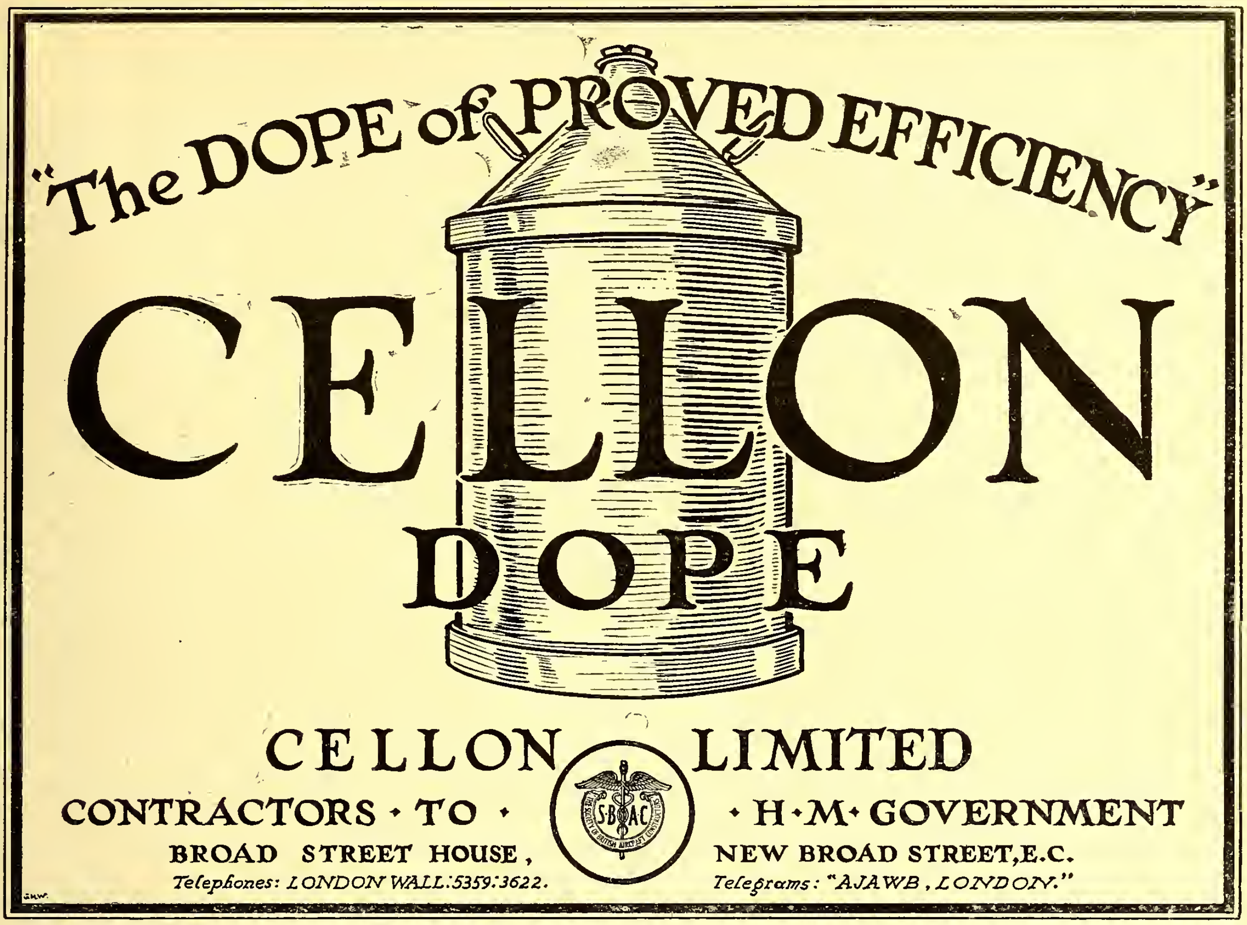

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Aircraft Manufacturing Co., Ltd., 47, Victoria St., S.W.
Armstrong, Sir W., Whitworth & Co., Ltd., Newcastle-on-Tyne
Blackburn Aero & Motor Co., Ltd , Olympia, Leeds
Bleriot Aeronautics, Brooklands Aerodrome
Boulton & Paul, Ltd., Rose Lane Works, Norwich
British & Colonial Aeroplane Co., Ltd. (The Bristol Co.), Filton, Bristol.
British Caudron Co., Ltd., Broadway, Cricklewood, N.
Curtiss Aeroplane Co., L. J. Seely, Clun House, Surrey St., Strand, W.C.
Davidson Aero Co., Ltd., Hammersmith, W.
Eastbourne Aviation Co., Ltd., Eastbourne
Grahame-White Co., Ltd., London Aerodrome
Handley Page, Ltd., 110, Cricklewood Lane, N.W.
London Aircraft Co., Urswick Rd., Lower Clapton, London, N.E.
Mann, Egerton & Co., Aircraft Works, Norwich
Martinsyde, Ltd., Brooklands, Byfleet
National Aircraft Co.,Ltd. 15, Hackney Rd.N.E.
Norman-Thompson Flight Co., Ltd., Bognor
Roe, A. V., & Co., Ltd., Manchester
Sage, F., & Co., Ltd., Peterborough
Saunders, Ltd., East Cowes, I.O.W.
Short Bros., Rochester, Eastchurch and Whitehall House, S.W.
Sopwith Aviation Co., Ltd., Kingston-on-Thames
Standard Aircraft Manufacturing Co., Effingham House, Arundel St., W.
Supermarine Aviation Co., Ltd., Southampton
Vickers, Ltd., Imperial Court, Basil Street, Knightsbridge, S.W.
Waring & Gillow, Ltd., Hammersmith
Wells Aviation Co., Ltd., 10a, Elystan Street, Chelsea
Westland Aircraft Works, Yeovil
White, J. Samuel, & Co., Ltd., East Cowes
Worms Aircraft Construction Co., Twickenham

AIRSHIPS—
Airships Ltd., 47, Victoria St., S.W.
Short Bros., Rochester, Eastchurch and Whitehall House, S.W.

ALUMINIUM CASTINGS—
Coan, R. W., 219, Goswell Rd., London, E.C.

ASH BENDS—
London Aircraft Co., Urswick Rd., Lower Clapton, London, N.E.

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The Deptford Steel & Iron Works, Ltd., 1 and 2, Old Pye St., Westminster

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Fairby Construction Co., Ltd., 117, Victoria St., S.W.
The Wilfley Co., Ltd., Salisbury House, London Wall

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Hobson, H.M., Ltd., 29, Vauxhall Bridge Road
A.B.C. Motors Ltd., Walton-on-Thames

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Coan, R.W., 219c, Goswell Road, London, E.C.

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Dunhill's, Ltd., Euston Rd., N.W.
Hazel & Co., 4, Princes St., Hanover Sq., W.
Robinson & Cleaver, Ltd., Regent St., London, W.

COMPONENT PARTS—
Worms Aircraft Construction Co., Twickenham
The Osborne Aircraft Co., Ltd., Whin Hill, Greenock, Scotland

CORDS, TAPES AND THREADS—
MacLennan, J., & Co., 30, Newgate St., E.C., and at Glasgow

DOPES—
British Aeroplane Varnish Co., Ltd., Milburn House, Newcastle-on-Tyne, and 166, Piccadilly
Cellon, Ltd., Broad St., House, New Broad St

ELECTRICAL ACCESSORIES—
The Edison Swan Electric Co., Ltd., Ponder's End, Middlesex

ENGINES AND PARTS—
A.B.C. Engine Co., Walton-on-Thames
Arrol-Johnston, Ltd., Dumfries
Beatty School of Flying, Ltd., London Aerodrome
Beardmore Aero Eng., Ltd , 112, Great Portland Street
Dudbridge Iron Works, Ltd. (Salmson), 87 Victoria St., London, S.W.
Gnome Engine Co., 47, Victoria St., S.W.
Gordon Watney, Ltd., Messrs., Weybridge
Green Engine Co., Ltd., Twickenham
Gwynnes, Ltd., Hammersmith Iron Works, Hammersmith, W.
Sturtevant Motors Co., 147, Queen Victoria St.
Sunbeam Motor Car Co., Ltd., Wolverhampton

FABRICS AND YARNS—
Greeves & Morton, Franklin St., Belfast
MacLennan, J., & Co., 30, Newgate St., E.C. and at Glasgow. Tapes, Cords & Threads.

FLYING SCHOOLS—
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Hall Aviation Co., London Aerodrome, Hendon

GALVANISING—
Cowper-Coles Manufacturing Co., Sunbury-on-Thames
Boulton & Paul, Ltd., Rose Lane Works, Norwich

GEARS—
Moss Gear Co., Ltd., Thomas St., Aston, Birmingham

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Adams & Co , Ltd., West Bromwich
Improved Liquid Glues Co., Ltd., Gt. Hermitage Street. (Croid.)
Mendine Co., 8, Arthur St, E.C.

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Brewster & Co.. 11, Queen Victoria St., E.C.

METAL PARTS AND FITTINGS—
Aircraft Supplies Co., Ltd., 17, John St., Theobald's Road, W.C.
Bayliss, Jones & Bayliss, Ltd., Wolverhampton (Bolts and Nuts)
Foster Engineering Co., Wimbledon
Mann, Egerton & Co., Ltd., 177, Cleveland St., London, W.
Mountford, Fredk., Ltd., Fremo Works, Lifford, Birmingham
Rubery, Owen & Co., Ltd., Darlaston
Sankey, J., & Sons, Hadley, Salop
Wooler Engineering Co., Ltd., Old Oak Lane, Willesden Junction, N.W.

MISCELLANEOUS—
Anderson, D., & Son, Ltd. (Roofs), Belfast
Anti-Glare Glass Co., Ltd., 78, Turnmill St., E.C.
Bowden Wire, Ltd., Willesden Junction
Brown Bros., Ltd., Great Eastern St., E,C
Edison Swan Electrical Co., Ponders End (Lamps)
General Aeronautical Co., Ltd., 30, Regent St., W. (Dope, Engines and Accessories)
Glasso Manufacturing. Co., Ltd., 211, City Rd., E C.
MacLennan, J., & Co., 30, Newgate St., E.C. and at Glasgow. Tapes, Cords and Smallwares.
Triplex Safety Glass Co., Ltd. (Screens, Goggles, etc.), 1, Albemarle St., Piccadilly, W.

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Oddy, W. D., & Co., Leeds
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Accles & Pollock, Ltd., Oldbury, Birmingham

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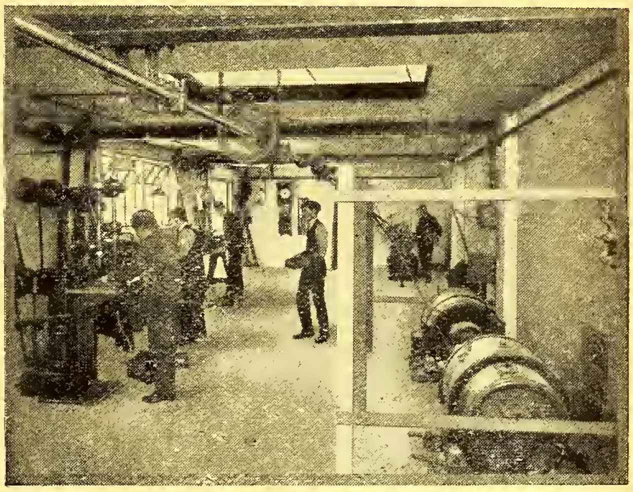

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(*Continued from page* 494.)

Flight Sub-Lieut. Robert Alexander Little, R.N.A.S.

For conspicuous bravery in successfully attacking and bringing down hostile machines on several occasions. On Nov. 11th, 1916, he attacked and brought down a hostile machine in flames. On Dec. 12th, 1916, he attacked a German machine at a range of 50 yards; this machine was brought down in a nose-dive. On Dec. 20th, 1916, he dived at a hostile machine, and opened fire at 25 yards range; the observer was seen to fall down inside the machine, which went down in a spinning nose-dive. On Jan. 1st, 1917, he attacked an enemy scout, which turned over on its back and came down completely out of control.

The King has further been pleased to approve of the award to the following officer of a Bar to his Distinguished Service Cross:—

Flight Lieut. Daniel Murray Boyne Galbraith, D.S.C., R.N.A.S.

For conspicuous gallantry. On Nov. 23rd, 1916, he attacked single-handed a formation of six hostile aircraft, no other Allied machines being near. One hostile machine was shot down, a second was driven down, under control, and the remaining four machines then gave up the fight and landed. In several other combats in the air Flight Lieut. Galbraith has displayed exceptional gallantry, particularly on Nov. 10th and 16th, 1916, on each of which days he successfully engaged and shot down an enemy machine. (The award of the Distinguished Service Cross was announced in "Gazette" of Oct. 25th, 1916.)

The following award has also been approved:—

To receive the Distinguished Service Medal:—Air Mech. Ernest W. Nelson, O.N. F.25205.

* * *

From the "London Gazette" Supplement, Feb. 17th, 1917.

War Office, Feb. 17th.

REGULAR FORCES.—The following Wt. N.C.Os. and Men to be temp. Sec. Lts.:—

Memoranda.—For duty with R.F.C.—Qr.-Mr.-Sgt. P. M. Brambleby, from King Edward's Horse; Lce.-Cpl. N. Couve, from King Edward's Horse, Jan. 25th.

Staff.—The following temporary appointments are made at the War Office:—

Staff Capt.—Temp. Maj. A. E. J. Reiss, attd. Ches. R., and to be transfd. to Gen. List, vice Lt. (temp. Capt.) C. Hirtzel, R.F.C., Spec. Res., Jan. 17th.

Establishments.—R.F.C.—Flt. Comdrs.—From Flying Officers and to be temp. Capts. whilst so employed.—Sec. Lt. J. L. Horridge, Spec. Res., Jan. 8th. Sec. Lt. R. W. Heath, Spec. Res., Jan. 18th. Temp. Sec. Lt. A. W. Bird, Gen. List; Sec. Lt. S. W. Dunckley, Spec. Res., Jan. 19th. Sec. Lt. W. R. Snow, Spec. Res., Jan. 22nd. Sec. Lt. E. D. Atkinson, Ind. Army Res. of Officers, Jan. 25th; Sec. Lt. E. J. Henderson, Spec. Res., Feb. 5th. Sec. Lt. (temp. Lt.) F. Fernihough, R.F.A., T.F.; Sec. Lt. J. W. James, Spec. Res., Feb. 7th.

Flying Officers (Observers).—Temp. Lt. A. P. Ravenscroft, R.A., and to be transfd to Gen. List, April 5th, 1916. Sec. Lt. (temp. Capt.) W. Benn, Yeo., T.F., May 12th, 1916. Temp. Sec. Lt. R. E. Thomas, S. Wales Bord., seny. from Sept. 26th, 1916. Temp. Sec. Lt. E. H. N. Stroud, attd. Leic. R., seny from Sept. 27th, 1916. Temp. Sec. Lt. C. C. G. Girvan, Lan. Fus., Feb. 1st, seny. from Oct. 3rd, 1916, Jan. 31st. Sec. Lt. H. I. Newton, Notts and Derby R., T.F.; Temp. Sec. Lt. (on prob.) G. Maddock, Gen. List, Feb. 2nd, seny. from Oct. 4th, 1916; Sec. Lt. (temp. Lt.) J. R. Samuel, Welsh R., T.F., Jan. 31st, seny. from Oct. 14th, 1916; Temp. Lt. J. Brooker, Welsh R., and to be transfd. to Gen. List, Feb. 2nd, seny. from Oct. 23rd, 1916; temp. Sec. Lt. (on prob.) K. R. Napier, Gen. List, seny. from Nov. 1st, 1916; temp. Lt. E. Thornton, Gen. List, but with seny. from Nov. 7th, 1916, Jan. 31st. Sec. Lt. (temp. Lt.) R. Rutherford, Mon. R., T.F., Feb. 2nd, but with seny. from Nov. 9th, 1916. Sec. Lt. F. Cade, Worc. R., T.F., Jan. 31st, seny. from Nov. 10th, 1916. Sec. Lt. (temp. Lt.) H. F. Duncan, High. L.I., T.F.; Sec. Lt. E. Harling, N. Lan. R., T.F., Feb. 2nd, seny. from Nov. 11th, 1916. Temp. Sec. Lt. (on prob.) A. Matthews, Gen. List, Jan. 31st, seny. from Nov. 18th, 1916. Paymr. and Hon. Capt. G. C. Easton, Canadian Inf., and to be temp. Capt. whilst so employed, from Nov. 25th, 1916, Feb. 2nd, seny. from Nov. 25th, 1916.

Balloon Co. Comdrs.—(Graded as Sqdn. Comdr.)—Capt. D. Rainsford-Hannay, Ind. Inf., from a Flight. Comdr., to be temp. Major whilst so employed, and to retain his present appointment as Comdt. of a Balloon School of Instrn., Dec. 5th, 1916.

Graded as Flt. Comdrs.—Temp. Sec. Lt. W. S. Huxley, Gen. List, from a Balloon Officer, and to be temp. Capt. whilst so employed, Jan. 13th, substituted for the notification of Jan. 30th.

Appointment of Sec. Lt. (temp. Capt.) W. Wallace, R.F.A., T.F., notified in the "Gazette" of Jan. 20th, is antedated to Sept. 8th, 1916.

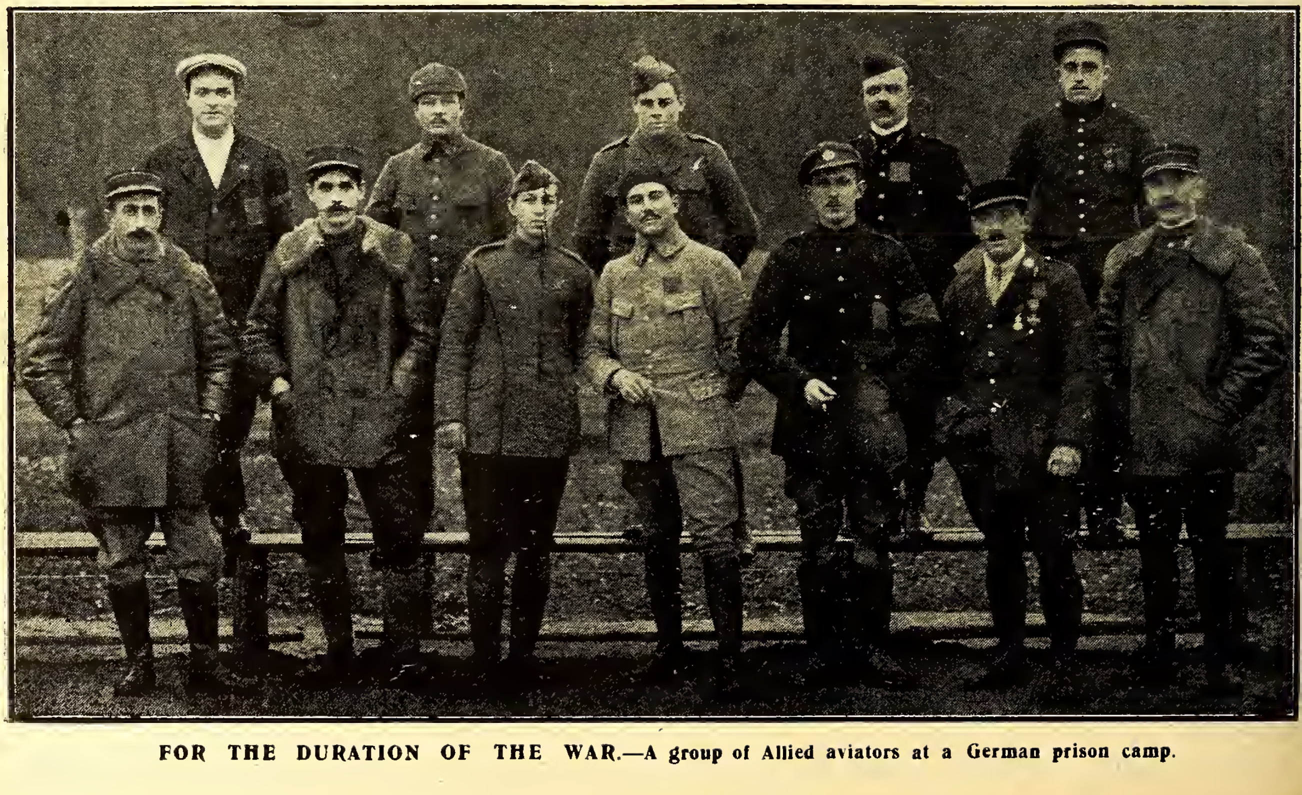
Balloon Officers.—Sec. Lt. L. L. Falck, Midd'x R., T.F., Dec. 19th, 1916. Capt. W. S. Ford, E. Surr. R., Spec. Res., from a Rail. Trans. Officer, and to remain secd., Jan. 2nd. Temp. Sec. Lt. N. J. Rich, R.E., Jan. 28th. Temp. Sec. Lt. W. V. Radford, Gen. List, Jan. 31st.

Equipment Officers, 2nd Cl.—Temp. Sec. Lt. J. M. Mitchell, Gen. List, from the 3rd Cl., and to be temp. Lt. whilst so employed, Jan. 25th.

3rd Cl.—Capt. E. S. Skipper, Spec. Res., from a Staff Lt., Nov. 7th, 1916, but with seny. from June 12th, 1915.

Memoranda.—Sgt. D. A. Neville, from R.F.C., to be temp. Sec. Lt. for duty with he Mil. Wing of that Corps, Feb. 7th. G. H. Ellis to be temp. Sec. Lt. (on prob.), for duty with R.F.C., Feb. 16th. C. Hines to be temp. Hon. Sec. Lt. whilst empld. with R.F.C., Feb. 18th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to



FOR THE DURATION OF THE WAR.—A group of Allied aviators at a German prison camp.

MORE PROOF!

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Regular Corps.—R.F.C.—The undermentioned Sec. Lts. (on prob.) confirmed in rank:—C. A. Brown, A. O. Roberts, H. C. Perks, S. Roche, J. H. F. Pilling, J. C. Murray, J. H. Cotton, C. R. Duggan, E. S. Crabtree, D. E. Barnett, F. W. Elstub, H. G. Day, F. M. Harding.

G. W. M. Whitton to be Sec. Lt. Dec. 9th, 1916. To be Sec. Lts. (on prob.): B. C. Adamson, Jan. 3rd; R. Waddell, Jan. 18th.

TERRITORIAL FORCE.—R.E.—Sec. Lt. G. E. G. Round is secd. for duty with the R.F.C., Jan. 29th.

Infantry.—Midd'x R.—Sec. Lt. (temp. Capt.) H. P. Maybury is secd. for duty with the R.F.C., July 19th, 1916.

Cambridgeshire R.—Sec. Lt. J. A. Loutit is secd. for duty with the R.F.C., Jan. 16th.

* * *

From the "London Gazette" Supplement, Feb. 19th, 1917.

War Office, Feb. 19th.

REGULAR FORCES.—Establishments.—R.F.C.—Sqdn. Comdrs.—Lt. (temp. Capt.) J. P. C. Sewell, Spec. Res., from a Flt. Comdr., and to be temp. Major whilst so empld., Feb. 5th.

Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so empld.:—Temp. Sec. Lt. (temp. Lt.) G. W. M. Green, Gen. List, Nov. 22nd, 1916. Lt. G. D. Gardner, York R., T.F., Dec. 11th, 1916. Temp. Capt. H. G. Kaye, Gen. List, from a Flying Officer, Jan. 1st. From Flying Officers, and to be temp. Capts. whilst so empld.:—Temp. Sec. Lt. (temp. Lt.) R. P. Willock, Gen. List, Jan. 26th. Sec. Lt. A. N. Benge, Spec. Res., Feb. 1st. Sec. Lt. W. H. K. Copeland, Yeo., T.F., Feb. 3rd.

Balloon Officers.—Temp. Capt. E. L. Chute, W. Rid. R., and to be transfd. to Gen. List, Jan. 17th. Sec. Lt. (temp. Lt.) W. R. Phillips, Lond. R., T.F.; temp. Sec. Lt. C. Hope, attd. Suff. R., and to be transfd. to Gen. List; temp. Sec. Lt. F. Planche-Hearn, R. Berks R., and to be transfd. to Gen. List; temp. Sec. Lt. P. King, attd. E. Surr. R., and to be transfd. to Gen. List; temp. Sec. Lt. (on prob.) H. F. N. Paull, Gen. List, Jan. 31st.

Equipment Officers, 2nd Cl.—From the 3rd Cl., and to be temp. Capts. whilst employed with detached wings of the R.F.C.—Lt. M. Hodge, Spec. Res. Sept. 26th, 1916. Lt. O. I. Preston, Notts and Derby R., T.F., Sept. 26th, 1916. Lt. C. H. Awcock, R.A., Oct. 11th, 1916.

TERRITORIAL FORCE.—W. Yorks R.—Sec. Lt. K. C. Horner is secd. for duty with the R.F.C., Jan. 25th.

Gordon Highrs.—Sec. Lt. J. Mundie is secd. for duty with the R.F.C., Jan. 21st.

Cameron Highrs.—Sec. Lt. J. E. de Watteville is secd. for duty with the R.F.C., Jan. 30th.

* * *

War Office, Feb. 19th.

The King has been pleased to award the Military Medal for bravery in the Field to the following Non-Commissioned Officer:

856 Flight Sergeant G. W. Halstead, R.F.C.

FROM THE COURT CIRCULAR.

Buckingham Palace, Feb. 14th.

The following officer had the honour of being received by the King, when His Majesty invested him with the Insignia of the Order into which he has been admitted:—

The Distinguished Service Order.

Lieut.-Col. Arthur Burdett, York and Lancaster Regt. and R.F.C.

The King then conferred decorations as follows:—

The Military Cross.

Major Owen Boyd, Indian Cavalry and R.F.C.
Capt. John Slessor, R.F.C.

* * *

Buckingham Palace, Feb. 17th.

The following Officers had the honour of being received by the King, when His Majesty invested them with the Insignia of Companions of the Order into which they have been admitted:—

The Distinguished Service Order.

Flight Lieut. Edward Pulling, R.N.A.S.
Major Malcolm Christie, R.F.C.

The King then conferred Decorations as follows:—

The Distinguished Service Cross.

Flight Lieut. Egbert Cadbury, R.N.A.S.
Flight Lieut. Gerrard Fane, R.N.A.S.

The Military Cross.

Capt. Roger Neville, Duke of Cornwall's Light Infantry and R.F.C.
Capt. Noel Webb, R.F.C.
Capt. John Whittaker, R.F.C.
Capt. Charles Woollven, Devonshire Regiment and R.F.C.
Lieut. Cyril Tiptaft, Connaught Rangers and R.F.C.
Sec. Lieut. Alfred Blenkiron, R.F.C.

NAVAL.

The following appointments have been made in the Royal Naval Air Service:—

Feb. 14th.—Flt. Comdr.—C. Draper, apptd. as Actg. Sqdn. Comdr., seny. Feb. 8th.

The undermentioned have been entered as Proby. Flt. Officers (temp.), seny. as follows:—C. H. Wein, Nov. 26th, 1916; J. L. Larigne, Dec. 2nd; E. E. La Beree, Dec. 3rd; H. L. Webster, Dec. 15th; L. L. Lindsay, Dec. 19th; T. B. Holmes, Dec. 20th; J. R. Wilford, Dec. 30th; G. A. Flavelle, S. W. Rosevear, H. McK. Reid, W. A. Carley, R. B. N. Venning, G. H. Boyce, E. L. MacLeod, and H. J. Wiser, all Jan. 19th.

Mr. J. L. Walshe granted a temp. commn. as Lt. (R.N.V.R.), seny. Feb. 12th.

Mr. L. H. Vint entered as Wt. Officer (2nd Grade), temp., seny. Feb. 19th.

Feb. 16th.—Lt. (Flt. Comdr.) R. B. B. Colmore promoted to Lt.-Comdr. (emergency list), with seny. Feb. 15th.

Mr. R. C. Tyler entered as Proby. Flt. Officer (temp.), seny. Dec. 19th, 1916.

Feb. 16th.—The following have been promoted to Lt.-Comdrs. (temp.) (R.N.V.R.), seny. Dec. 6th, 1916:—E. W. Stedman, A. V. Thompson, H. M. Whitley, H. E. Wimperis, H. H. Wylie, R. V. C. Brook, J. Graig, F. W. Gardner, W. Higginbotham, L. C. Hope, A. Landells, G. McAlpine, E. G. L. Roberts, and R. V. Southall.

Feb. 17th.—The following have been entered as Proby. Flt. Officers (temp.), seny. as stated, and all apptd. to "President," addl., for R.N.A.S.:—A. J. Dixon, Dec. 3rd, 1916; L. J. Dunham, Dec. 4th; H. H. S. Fowler, Dec. 7th; N. G. Fraser, Dec. 17th; J. E. Greene, Dec. 19th; K. V. Turney, C. W. L. Calvert, C. G. Davis, and R. C. Whitfield, all Dec. 20th; M. V. Kelly, Dec. 21st; T. Richardson, A. A. Bishop, J. A. Mundell, J. E. C. Howard, W. C. Jeffries, R. E. McMillan, H. J. Connolly, B. W. Broatch, G. N. Shea, G. L. Trapp, E. V. J. Grace, C. J. Poulin, H. A. Urquhart, H. A. Yates, J. McClinton, M. S. Taylor, A. Woods, L. Rosenbaum, W. S. Barry, R. H. Barkley, D. E. M. Grier, and L. J. Stanyon, all Jan. 19th.

Mr. H. Girdlestone granted temp. commn. as Sub-Lt. (R.N.V.R.), seny. Feb. 16th, and apptd. to "President," addl., for R.N.A.S.

Feb. 19th.—Mr. O F. McGregor entered as Proby. Flt. Officer (temp.), seny. Dec. 20th.

The following have been granted temp. commissions as Lt. (R.N.V.R.), seny. as stated:—A. W. Sarsons (Air Mech., 1st Grade), and L. W. Carr, Feb. 16th; T. J. Offer, W. Burkinshaw, A. Farquhar, S. Strong-Brownhill, and J. C. Rennie, all Feb. 17th.

Admiralty Communiqués.

Feb. 15th.—On the 14th inst. an attack was carried out by naval aeroplanes on the harbour and shipping of Bruges.

A considerable weight of bombs was dropped with most successful results.

All pilots and machines returned safely, with the exception of one.

Feb. 15th.—On the 10th inst. naval aircraft carried out a successful bomb attack in the Eastern Mediterranean, causing considerable damage to the permanent way south of Yenikeui Bridge.

On the 8th inst. a raid was carried out by naval aeroplanes on the shipping in Bruges Harbour.

A number of heavy bombs were dropped with good effect; large fires were observed.

A hostile aeroplane was brought down.

Feb. 18th.—An attack on the Ghistelles (south of Ostend) aerodrome was carried out by naval aeroplanes on the 16th inst. Heavy bombs were dropped with good results.

At the same time the shipping and harbour of Bruges were again attacked, bombs being observed to explode on the objectives.

The Casualty List.

Reported Feb. 14th.

Killed.—Hart, W. H., Air Mech. 1st Grade, F.10845.

Missing.—Milne, J., Air Mech. 2nd Grade, F.5396.

Reported Feb. 19th.

Missing.—Blagrove, Flt. Lt. Cecil R., R.N.

Previously reported Missing, now reported Prisoners.—
Greig, Flt. Sub-Lt. Charles W., R.N.
Torrington, Lieut. Lord, R.N.V.R.

Believed Prisoners.—Maitland-Heriot, Flt. Lt. Charles A., R.N.
Jameson, Sub-Lt. Wilfred C., R.N.V.R.

Died of Injuries.—Legge, Sub-Lt. Walter H., R.N.V.R. (attd. R.F.C.).

PERSONAL NOTICES.

Marriage.

TRAVERS—WHITE.—On Feb. 17th, 1917, at Clapham Parish Church, by the Rev. F. R. Blatch, assisted by the Rev. Prebendary A. E. Dalton, Rector of Clapham, Flight Sub-Lieut. Ernest John Travers, R.N.A.S., was married to Edith Alison, youngest daughter of A. R. White, 31, North Side, Clapham Common.

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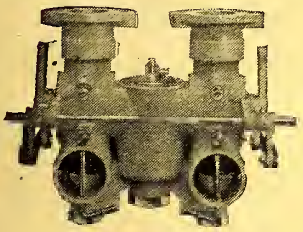

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BIRTHS.

HALLAM.—On Feb. 14th, at 5, Sydney Grove, Hendon, the wife of Flight Commander D. Hallam, R.N., of a son.

* * *

TRAVERS.—On the 16th inst., at 34, Emperor's Gate, S.W., the wife of Flight Commander Benjamin Travers, R.N., of a son (still-born).

It is announced that Lieut. Lord Torrington, R.N.V.R., is now officially reported to be alive and a prisoner in the hands of the Bulgarians. Lord Torrington, who was engaged in duties connected with the R.N.A.S., was previously stated to have been killed in the Balkans early in January.

MILITARY.

G.H.Q. COMMUNIQUÉS.

FEB. 14th, 8.27 p.m.—One German aeroplane was destroyed in air fighting yesterday on our side of the line, and one of our machines was brought down.

FEB. 15th, 8.36 p.m.—On the night of the 13th-14th inst., and again yesterday, bombs were dropped by our aeroplanes on a number of places of military importance behind the enemy's lines.

One German machine was destroyed in air fighting, and two others were driven down damaged. One of our machines was also brought down and two other of our aeroplanes are missing.

FEB. 16th, 8.50 p.m.—Yesterday one British aeroplane and three German machines, one of which fell on our side of the line, were brought down in air fights, while five other enemy machines were driven down damaged. A ninth hostile aeroplane was brought down by our anti-aircraft guns. Four other British machines are missing.

FEB. 17th, 9.5 p.m.—In the course of air fighting yesterday one German aeroplane was brought down in our lines, and two others were driven down in a damaged condition. One of our machines is missing.

THE CASUALTY LIST.

Reported Feb. 14th.

KILLED.—Davis, Sec. Lt. H. J., Lincoln Regt., attd R.F.C.
Pateman, Sec. Lt. H. L., R.F.C.

WOUNDED.—Macdonald, Lt. W. B., Can. Inf., attd R.F.C.
Vickery, Sec. Lt. F. W. A., Durham L.I., attd R.F.C.

MISSING.—Gibbon, Sec. Lt. J. T., R.F.C.
Lucas, Lt. T. C. H., Suffolk Regt. and R.F.C.
Maule, Lt. E. B., Highland L.I., attd. R.F.C.
Woods, Sec. Lt. M. E., R.F.C.

Reported Feb. 15th.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED.—Carbert, Capt. C. M., M.C., Can. Inf., attd. R.F.C.

MISSING.—Erlebach, Sec. Lt. E. E., R.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED WOUNDED AND PRISONER IN GERMAN HANDS.—White, Lt. R. W., Gen. List, attd. R.F.C.

WOUNDED.—R.F.C.—Hutchinson, 38292 2nd Cl. Air Mech. J. J. (Belfast).

Reported Feb. 16th.

WOUNDED.—Copeland, Sec. Lt. W. H. K., Yeo. and R.F.C.
R.F.C.—McDonald, 9499 2nd Cl. Air Mech. K. C. (Southall). Tattersall, 21353 1st Cl. Air Mech. W. (Haslingden).

PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED OF WOUNDS AS A PRISONER OF WAR IN GERMAN HANDS.—Shepherd, Sec. Lt. A. L. M., K.R.R.C., attd. R.F.C.

Reported Feb. 17th.

KILLED.—Docking, Lt. R. J., E. Kent R., attd. R.F.C.

DIED OF WOUNDS.—McMillan, Capt. J. C., R. Scots Fus., attd. R.F.C.

WOUNDED.—Nesbitt, Lt. A. N., R.F.C.
Puckridge, Sec. Lt. H. V., Shropshire L.I., attd. R.F.C.

ACCIDENTALLY KILLED.—R.F.C.—Dade, 9832 1st Cl. Air Mech. E. R. (Lincoln).

Reported Feb. 19th.

KILLED.—Porkess, Lieut. W. A., Yeomanry and R.F.C.
Roberts, Sec. Lt. E., R.F.C.

WOUNDED.—Aizlewood, Capt. L. P., M.C., York and Lancaster Regt. and R.F.C.
Edelston, Sec. Lt. T. S., R.F.C.
Fleming, Sec. Lt. F. I., R.F.C.
Rock, Lt. J. M. J. C. J. I., Bedford Regt. and R.F.C.
Smith, Sec. Lt. A. E. P., R.F.C.

ACCIDENTALLY KILLED.—R.F.C.—Bailey, 27465 2nd Cl. Air Mech. L. L. (Widnes).

PREVIOUSLY MISSING, NOW REPORTED BY GERMAN GOVT. KILLED OR DIED OF WOUNDS. — R.F.C. — Glover, 1864 Sgt. J. E. (Splott, Cardiff).

Reported Feb. 20th.

MISSING.—Howard, Sec. Lt. J. K., Sherwood Foresters and R.F.C.
Thorburn, Capt. J., R.G.A. and R.F.C.

KILLED.—R.F.C.—Hartley, 33728 2nd Cl. Air Mech. B. (London, N.W.)

WOUNDED.—R.F.C.—Cox, 290 Flt. Sgt. C. J. (York).

MISSING.—R.F.C.—Shaw, 917 Sgt. J. F. (Rugeley).

INDIAN FORCES.—PREVIOUSLY REPORTED MISSING, NOW UNOFFICIALLY REPORTED KILLED.—Buck, Lt. C. M., I. A. Res., attd. R.F.C.

PERSONAL NOTICES.

DEATHS.

CARBERT. — Capt. Charles Molyneaux Carbert, Canadian Infantry, attd. R.F.C. (previously reported missing, now reported killed), was awarded the Military Cross, the official account of the award stating that "he led his men in the attack with great gallantry. Later, he assumed command of his company, dis-

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playing great courage and determination. He materially assisted in the success of the operation." The award was gazetted in November of last year.

* * *

DAVIS.—News has reached Spilsby (Lincs.) of the death of Lieut. Horace J. Davis, R.F.C., who has been killed while flying at the front. Mr. Davis, who was 23, and was on the staff of the Capital and Counties Bank, joined the forces early in the war, and after going through the O.T.C., was gazetted to the Lincolnshire Regt. He saw much active service, and was afterwards transferred to the R.F.C. At the time of his death he was engaged in photographing and locating enemy posts. His pilot, Mr. Patman, was also killed. Mr. Davis, who was a native of Kent, was married to a daughter of the manager of Messrs. Barclay's Bank at Spilsby.

* * *

DENDRINO.—Sec. Lt. Stephen Dendrino, R.F.C., was reported missing after an air fight on Sept. 28th last. It has been established that he was the aviator mentioned by the German Boelcke in his recently published logbook as having been killed by him in an air fight on Sept. 28th, but whose machine, nevertheless, continued to fly round in even circles owing to the controls having been fastened in position with rubber bands. Boelcke's logbook quoted the number of the British aviator's machine, which corresponded with that which Mr. Dendrino was flying when killed. Mr. Dendrino, who was 28 years old, was educated in the "Worcester." He entered the mercantile marine, and afterwards was an officer in the P. and O. Service, in which he held a second mate's certificate when he left in 1916 to join the R.F.C. He was first under fire (as a P. and O. officer) at the landing and re-embarcation of the Indian Expeditionary Force at Tanga, in East Africa, where he was in charge of boats. Without any previous knowledge of flying, he gained his "wings" as a flying officer in less than six weeks, and in eight weeks was at the front on active service, taking part in the bombing of Mons. He was the son of Mrs. Woodiwiss, and stepson of Mr. S. Woodiwiss, of Graveleys, Great Waltham, near Chelmsford.

* * *

JACKSON.—Sec. Lt. Arthur Jackson, R.F.C., was killed as the result of an aeroplane accident on Feb. 7th. He was the son of the late Charles Napier Jackson and Mrs. Jackson, of 39, Heathland Road, Stoke Newington. He was 18 years of age.

* * *

LANGRISHE.—Sec. Lieut. Hercules Ralph Langrishe, Yeomanry, attd. R.F.C. (killed while flying on duty on Feb. 16th), was eldest son of Sir Hercules Langrishe, of Knocktopher Abbey, County Kilkenny. He was 29 years of age, and his commission in the Yeomanry was dated Aug. 29th, 1914.

* * *

MACMILLAN.—Lieut. H. Macmillan, R.F.C., was killed at Montrose on Feb. 15th, through his aeroplane overturning and catching fire. He belonged to Glasgow, and was 25 years old.

* * *

MATTHEWS.—News has come to Scarborough of the death at the front of Lieut. H. Matthews, R.F.C. Mrs. Harry Tindall, sister of the gallant officer, who resides in Falsgrave Road, Scarborough, has received the following letter from Lieut. Douglas F. Woodford: "I regret to say that Lieut. Matthews was killed on Jan. 15th in a combat with two German aeroplanes over the enemy's lines. His pilot also was killed. A message dropped later by the German flying corps informed us of their fate."

A further letter states that Mr. Matthews died fighting against overwhelming odds. Mr. Matthews was in business in Hull when war broke out, and he enlisted in the East Yorkshire Regt., subsequently receiving a commission and being transferred to the R.F.C. He was the son of Mr. Alfred Matthews, of Newboro Street, Bootham, York.

* * *

MYERS.—Sec. Lieut. Frank Michael Myers, M.C., Suffolks, attd. R.F.C., killed in action on Feb. 14th, was the son of Mr. and Mrs. C. B. Myers, of Johannesburg, and nephew of Mrs. J. Schumers, of Golders Green.

* * *

NISBET.—Sec. Lt. F. W. Nisbet, R.F.C., killed while flying at the front, aged 19, was the only surviving son of Mr. and Mrs. William Nisbet, of 8, Palace Road, Kingston-on-Thames. He was educated at Shrewsbury House School, Surbiton, and Marlborough, and enlisted in the Yorkshire Dragoons in August, 1914, being granted a commission in the same regiment in June, 1915. He transferred to the R.F.C. last September, and was gazetted a flying officer in December, 1916.

* * *

SPICER.—Sec. Lieut. Edmund Daniell Spicer, whose death was announced last week, took his pilot's certificate at Hendon in August, 1915, obtained his commission in the R.F.C. on April 22nd, 1916, and went on active service on July 4th.

His commanding officer writes: "He very soon became one of the most reliable pilots I have ever known. He was most extraordinarily persistent, and we always used to feel that if he was leading a reconnaissance it was sure to be successful. . . . He was always one who would seek danger rather than avoid it, and one cannot possibly blame a fellow who is braver and more dashing than he ought to be."

* * *

STEWART.—Lieut. N. W. Stewart, Royal Scots, attd. R.F.C., who died of wounds on January 23rd, was the elder son of the Rev. Alexander Stewart, Hartington Place, Edinburgh, minister-emeritus of Newton Stewart. He was a student of science and medicine at Edinburgh University, where he took first and second class certificates and a medal. He also had a gold medal and other prizes from the University O.T.C. He was a keen athlete.

* * *

WHITE.—Lieut. Spencer John Meadows White, Norfolk Regt. and R.F.C., was the eldest son of the Rev. L. Meadows White, vicar of Potter Heigham and Repps, and Mrs. White, and eldest grandson of the late Prebendary Borrett White, of St. Paul's Cathedral. He was born in 1889, and was educated under Mr. J. Bruce Payne at St. Aubyn's, Lowestoft, and afterwards at Bishop's Stortford. He joined the Norfolk Regt. as dispatch rider in the first month of the war, obtained his commission in Sept., 1914, and took part in the landing at Gallipoli in August, 1915. He was removed, seriously ill, just before the evacuation, and spent some months in hospital and convalescent home in Alexandria.

Later he was stationed in the desert near the Suez Canal, and joined the R.F.C. last summer. He was killed on Jan. 15th in a fight with two fast German machines when on escort duty.

* * *

WILSON and BROWN.—An inquest was held at Wilton, Upavon, on Feb. 15th, concerning the deaths of Sec. Lt. Gordon Ivor Wilson, Yorkshire Hussars, attached R.F.C., aged 20, son of Mr. and Mrs. Alex. Wilson, of Shovell, near Bridgwater, and Sec. Lt. George Trevor Brown, Wiltshire R., attached R.F.C., aged 25, whose home is Blackford, Glamorganshire. Mr. Wilson was regarded as quite a proficient aviator, and was in training for service abroad, he having recently received his "wings."

Both the officers were flying unaccompanied, and it was shown that the biplanes had been used immediately before the fatal flights were made, and were in perfect order. Except for the fact that there was a slight haze, the meteorological conditions were favourable for flying. Shortly before the accident, the machines were under observation from the ground, but no one actually saw what happened sufficiently clearly to be able to speak to the cause with certainty.

One of the machines fell first, and it was so immediately followed by the other that it was generally assumed that they had come into collision. Another aviator who was in the air at the time saw Mr. Wilson take a turn, and directly afterwards what were thought to be parts of his craft flew off. This witness, however, did not notice the presence of Mr. Brown's aeroplane at the moment. Several officers spoke to the efficiency of the two pilots. The jury returned a verdict that the officers met with their death through an accident, due to their machines coming into collision in the air.

ENGAGEMENTS.

BOUSTEAD—HUSEY-HUNT. — A marriage has been arranged, and will shortly take place, between Capt. Cedric Boustead, Middlesex Regt., attd. R.F.C., third surviving son of Mr. and Mrs. J. M. Boustead, Westfield, Wimbledon Common, and Dorothea Joyce, daughter of Mr. and Mrs. Husey-Hunt, of Hove, Sussex.

* * *

HIGGINBOTHAM—CATTO.—The marriage arranged between Lieut. H. C. Higginbotham, Argyll and Sutherland Highlanders, attached R.F.C., eldest son of R. K. Higginbotham, Braehead House, Bearsden, and Christian, elder daughter of J. K. Catto, J.P., Willaston House, near Chester, will take place shortly.

* * *

MANN—DUNK.—An engagement is announced between Lieut. H. Bagshaw Mann, R.F.C., late Royal Fusiliers, only son of Mr. and Mrs. J. Bagshaw Mann, of Ealing, and Margaret A. Dunk, only daughter of Mr. and Mrs. William Dunk, of Mount Park Road, Ealing.

* * *

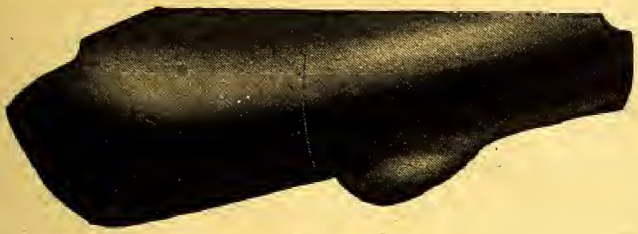
THOMPSON—MILLS. — The engagement is announced of Lieut. Stewart W. Thompson, R.F.C., elder son of R. C. Thompson, Morton House, Fence Houses, and Madge, widow of Gordon Mills, Coldstream Guards, and elder daughter of H. Slowburn, Richmond House, Wimbledon Common.

MARRIAGES.

CULLEN—THOMPSON.—On the 17th inst. at St. Marylebone Church, by the Rector, the Rev. Dr. Morrison, assisted by the Rev. H. E. Robinson, Rector of Tingrith, Beds, Lieut. Walter Douglas Cullen, East Surrey Regiment, attd. R.F.C., son of Mr. and Mrs. W. H. Cullen, Mickleham Downs, near Dorking, was married to Gwendolen Margaret, only daughter of Mr. and Mrs. George W. Thompson, of 80, Harley Street, London, W.

* * *

DRUMMOND SMITH—WARD. — On Feb. 14th, at Christ Church, Clapton, by the Rev. E. J. Hewlett, James Drummond



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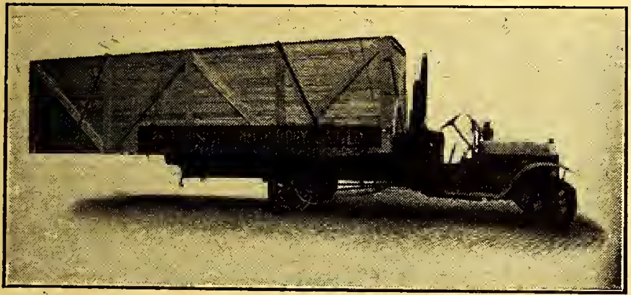

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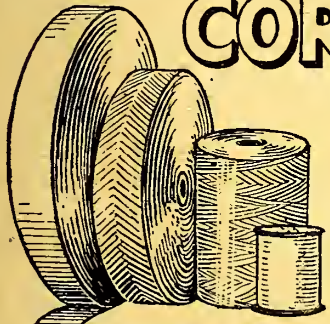

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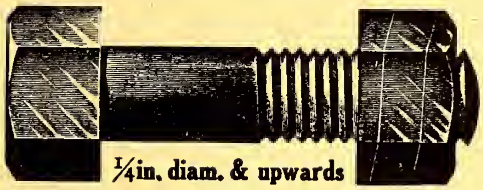

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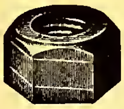

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Smith, R.F.C., was married to Edith Marion, youngest daughter of Mr. and Mrs. Samuel Ward, Redcot, Exeter.

* * *

GRACE—APPERLY.—On Feb. 12th, at St. Margaret's, Chipstead, by the Rector, the Rev. Prebendary Stone, M.A., Sec. Lieut. F. A. D. Grace, R.F.C., late of San Pedro de Jujuy, eldest son of Mr. and Mrs. A. A. Grace, of Rosario, was married to Sybil May, youngest daughter of Mr. and Mrs. Herbert Apperly, of "Highwoods," Kingswood, Surrey.

* * *

GRIFFIN—OXENHAM.—The marriage between Lieut. C. S. J. Griffin, Gordon Highlanders and R.F.C., only son of Lieut.-Col. C. P. G. Griffin, D.S.O., and Mrs. Griffin, Berridon Hall, Bradworthy, Devon, and Sybil K. E. Oxenham, only daughter of the late Samuel Oxenham, 8, Devonshire Place, Eastbourne, and Mrs. Glynn, wife of Col. T. G. P. Glynn, C.M.G., The Grenfalls, Cheltenham, took place at St. Michael's Church, Chester Square, on Tuesday, Feb. 20th, at 12 o'clock.

* * *

HICKS—BAKER. — On Feb. 15th, at St. Peter's, Cranley Gardens, by the Rev. Prebendary Swayne, Sec. Lieut. (Acting Flight Commander) Charles Lionel Hawtrey Hicks, youngest son of Capt. Hicks, R.N., of The Moorings, Sevenoaks, and The Oaks, Halifax, Nova Scotia, was married to Lilian Frances Law (Lily), daughter of the late John Law Baker and Mrs. Baker, of Azul and Temperley, Buenos Aires, Argentine Republic.

* * *

STURROCK—M'ALISTER.—On the 12th inst., at The Elms, Kilmarnock, by the Rev. Wm. Dunnett, M.A., V.D., Laurence Anderson Sturrock, Lieut., Indian Army, and R.F.C., son of the late John Sturrock, Solicitor, Kilmarnock, was married to Mary Kennedy Frier, daughter of William M'Alister, M.D. At home, Wellwood, Barassie, March 7th, 8th, and 9th.

Memorial tablets have been erected in Harrow Parish Church in memory of Lieut. G. J. L. Welsford, R.F.C., son of Mrs. Freeborn, wife of Major Freeborn, commanding the Harrow O.T.C., who was killed in an air fight in France.

* * *

Capt. Allen, R.F.C., was shot in the thigh while asleep in his hut at a Lincolnshire aerodrome in the early hours of Feb. 16th. A searching investigation has failed to reveal any clue to the identity of the officer's assailant.

When the shot was heard in the camp the sentries raised an alarm, the guard was turned out, and a search was made. Capt. Allen, who is 22 years of age, was found with a bullet wound in the thigh, and a broken window pane showed the direction whence the bullet had come. Other officers sleeping near him were not disturbed by the report. There is little doubt that the shot was fired by someone standing in the camp.

Capt. Allen's wound is not considered dangerous. He is reported to be progressing satisfactorily.

* * *

The Freedom of the City of Nottingham was bestowed on Capt. Albert Ball, R.F.C., on Feb. 19th, in recognition of his brilliant work as a flying officer in the war. Capt. Ball, who is the son of a previous Mayor of Nottingham, who is a director of the Austin Motor Co., is not yet 21. He has received the Distinguished Service Order, the Military Cross, and a Russian Order. The certificate of enrolment was enclosed in a silver casket, Capt. Ball's name being added to the brief list of honorary freemen, which includes the late General Booth, a native of Nottingham, and the Duke of Portland, Lord Lieutenant of the City and the County. The Mayor spoke of Capt. Ball as having at the age of 19 engaged in over 100 fights and brought down 29 victims. The value of his methods had been recognised by his appointment as an instructor. The Sheriff of Nottingham alluded to Capt. Ball as having brought honour also to Trent College, where he was a former student. Capt. Ball expressed his hope of proving himself worthy to be included among the distinguished freemen of Nottingham. His only desire was to serve his country and bring credit to his native city.

FRANCE.

Official Communiqués.

Feb. 14th.—A German aeroplane this morning dropped bombs on Dunkirk, but there were no victims and no damage was done. Bombs were also dropped in the region of Pompey (Meurthe and Moselle). Two civilians were killed and two others wounded.

German aeroplanes again threw bombs in the evening in the Dunkirk district. Several civilians were killed and others injured. Nancy was also bombarded by aeroplanes this morning. There was no victim.

During the night of Feb. 13th-14th our air squadrons dropped projectiles on the aviation grounds of Etreillers (Aisne) and Sancourt (Somme) on the stations of Athies, Hombleux, Voyennes, Curechy, St. Quentin, and Ham, as well as on the factories east of Tergnier, where several explosions were observed.

The Army of the Orient.—The railway station of Krivolak was bombarded by French aeroplanes. A British air squadron blew up an ammunition depot north of Demir Hissar.

Feb. 15th.—Yesterday morning a German aeroplane was brought down in aerial fighting. The machine fell in flames in our lines between Custines and Moiey (Meurthe-et-Moselle).

In the course of yesterday and during last night our air squadrons successfully bombarded the aviation grounds at Colmar, Varennes, and Matigny, the railway station at Athies, and the bivouacs at Curchy.

A German aeroplane was brought down yesterday near Beaumont (Meuse) by the fire of our anti-aircraft guns.

Feb. 16th.—In the course of yesterday our battle aeroplanes fought a number of engagements in which five German machines were brought down, one by Adjudant Madon, who thus scored his seventh success.

During the night of Feb. 15th-16th our air squadrons bombarded the railway station of Voyennes, the railways in the St. Quentin and Ham districts, the bivouacs and the railway station at Spincourt, the blast furnaces at Uckingen, Rombach, and Maizières-les-Metz, the aviation ground and the barracks at Dieuze, and a military park to the north of Vic (west of Dieuze, Lorraine).

Feb. 17th.—Further information received shows that on Jan. 23rd Capt. Doumer brought down a German aeroplane. This is the fifth machine destroyed up to the present by this officer. Yesterday one of our pilots brought down a German captive balloon in the region of Marvaux (south of Vouziers, Ardennes).

[Capt. René Doumer is a son of M. Paul Doumer, Senator, and President of the Chamber of Deputies.—Ed.]

Feb. 19th.—On Saturday night a Zeppelin flew over the French coast of the Pas de Calais as far as the suburbs of Boulogne and threw several bombs, without, however, achieving any results.

* * *

It is reported from Paris that President Poincaré presented decorations to a number of British and French aviators. To Lieut. Guynemer, who has now brought down over 30 enemy aeroplanes, he handed the Cross of St. George on behalf of the Emperor Nicholas, informed him of his promotion to the rank of Captain, and invited him to luncheon with Signor Bissolati, Generals Nivelle, Foch, Gerard, and Ignatieff.

* * *

A report from Paris on Feb. 12th stated that an official decree appoints General Guillemin Director-General of Aeronautics throughout the country as well as the Army.

GERMANY.

Official Communiqués.

Feb. 15th.—A clear sky favoured aerial activity from the Channel to the Vosges. Yesterday the enemy lost seven aeroplanes, of which Lieut. von Richthofen brought down two—his 20th and 21st victories in aerial battle.

Feb. 16th.—On the evening of Feb. 14th, naval aeroplanes again successfully bombed the aerodrome at St. Pol, near Dunkirk. Hits and a conflagration were observed in the airsheds. On the return flight, near Dunkirk, aviators observed the reflection of a fire, which was visible for a great distance. All our aeroplanes returned undamaged.

Main Headquarters.—Both by day and night there was much aerial activity on both sides. In aerial fighting and by anti-aircraft and infantry fire the enemy lost seven aeroplanes.

Feb. 17th.—Our aeroplane squadrons copiously bombed important establishments behind the enemy front. On the Somme several munition dumps belonging to the enemy blew up. The report of the explosion and the shaking of the earth could be felt as far as St. Quentin.

On Thursday night German aeroplanes dropped bombs on the aerodromes at St. Pol, near Dunkirk, and Coxyde. Hits on the buildings and aerodrome plants were observed.

Feb. 18th.—During the night of Feb. 16th-17th one of our airships dropped bombs freely on the town and harbour of Boulogne.

Feb. 19th.—On the Macedonian front two enemy aeroplanes were shot down.

* * *

It is reported from Amsterdam that a heavy fall of snow, followed by a severe frost, has caused the roof of a building at Leipzig, in which an airship was being constructed, to collapse, with the result that forty workmen were injured.

RUSSIA.

Official Communiqués.

Feb. 13th.—Aviation.—Our aviators dropped four bombs on the enemy aerodrome in the village of Kobylnik (north of Lake Narotch).

Enemy aeroplanes dropped bombs on the Pogoreltsy Station on the Alexandrovsk railway, also on Lutsk and on the region south-east of Halicz.

North-east of Focsani one of the French aviators entered into combat with an enemy machine, which, after several minutes, rapidly descended, apparently damaged.

Feb. 14th.—In the Riga region, south of Friedrichstadt and west of Dvinsk, three enemy aeroplanes, which were bombarded by our fire, were forced to descend into the enemy's position.

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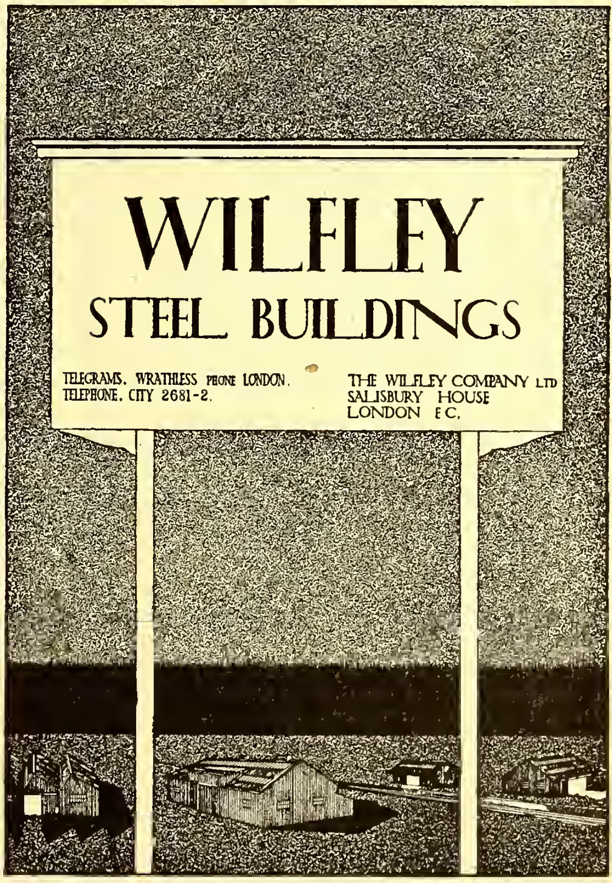
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AUSTRIA.

By the recent capture of the naval aviator Babic, the Austrian aerial fleet has lost one of its best pilots. This officer flew over Venice on several occasions, and took part in the raids on Padua and other places.

ITALY.

It was reported on Feb. 11th that a number of Italian aeroplanes belonging to a squadron in the Upper Adriatic carried out a raid on Muggia, near Trieste, dropping numerous bombs on the naval dockyard of San Rocco, which caused great fires. All the machines returned undamaged to their bases.

It was semi-officially announced that on Feb. 12th a squadron of Italian seaplanes made a raid on the fortress of Pola.

After dropping a quantity of explosive and incendiary bombs with visibly good results on the arsenal and vessels in the harbour, all the machines returned safely to their base.

At 5 a.m. on Feb. 13th, a squadron of enemy aeroplanes made an aerial raid on Brindisi and dropped some bombs, which fell on a private residence and also on hospital train No. 45. Two civilians were wounded and six men of the First Red Cross Company of Turin, two of them seriously.

* * *

Rome, Jan. 16th.—The Ministry of the Marine announces that "In the morning of the 14th, near the Dalmatian Islands, an Austrian steamer was torpedoed and sunk by a French submarine attached to our Naval forces. The submarine was attacked without success by an Austrian aeroplane."

* * *

Capt. Gabriel d'Annunzio has been awarded the Croix de Guerre by the French Government in recognition of his services in stimulating enthusiasm for our just war among the Latin peoples by his speeches and example. The poet has, as is known, lost the use of his right eye, and so was wearing the "mutilated" decoration as well as the Croix when last at Venice.

* * *

Another observer to be decorated was Lt. Gio. Pirelli, of tyre fame, who has been flying over the enemy for rather more than a year now.—T. S. H.

BELGIUM.

Official Communiqués.

Feb. 2nd.—Notwithstanding the rigour of the temperature, the Belgian aviators have been very active in the course of last week. Raids of reconnaissances have brought valuable information. The Belgiana chasing aeroplanes have engaged in more than twenty fights, in the course of which Capt. Jacquet with Lt. Robin (observer) brought down his fifth machine off Westende.

Feb. 18th.—Great activity in Belgian aviation, owing to the clear weather. Flt. Sub-Lieut. Olieslagers has forced two enemy machines to land damaged. At different times various enemy installations behind the lines have been bombarded.

HOLLAND.

It was reported from Holland on Feb. 18th that Zeppelins had been reported over different parts of Holland. At Gameren, near Zaltbommel (about 25 miles south of Utrecht), a Zeppelin was reported proceeding from west to east at 6 a.m. on Feb. 17th, flying very low. Zeppelins were also seen at Grave, and Osch, and near Gorinchem (all east of Zaltbommel).

TURKEY.

Official Communiqués.

Feb. 13th.— Dardanelles Front.—Sub Lt. Mernike attacked three hostile aeroplanes and brought one down. The two British officers in charge of this machine were made prisoners. The machine-gun was destroyed, and three unexploded bombs fell into our hands.

Feb. 18th.—In the Dardanelles on Feb. 17th, Lieut. Meiuike brought down a British aeroplane armed with two machine-guns, and the pilot was taken prisoner. The machine, which is almost intact and will be available for use after some slight repairs, is in our possession.

BULGARIA.

Official Communiqués.

Feb. 12th.—There was lively aeriol activity in the Vardar Valley and along the coast of the Gulf of Orfano. East of the station of Dovo, Sub-Lieut. Braunnock brought down a British biplane, which crashed to earth. The pilot was killed.

Feb. 13th.—There was considerable aviation activity on both sides. An enemy aeroplane fell near Demir Hissar. The machine was undamaged, and the pilot unhurt.

Enemy aeroplanes dropped bombs unsuccessfully on the railway station of Oktchilar and on the road bridge near Buk.

Feb. 18th.—There was aerial activity on the whole front. An enemy aeroplane was brought down in the Cerna bend by artillery fire. Two enemy aeroplanes dropped eight bombs on Oktchglar railway station without doing any damage.

ROUMANIA.

Official Communiqué.

Feb. 15th.—A French aviator brought down a German aeroplane, which fell into our lines south-west of Birlat [?Berlad, in Moldavia]. The enemy pilot was killed.

SPAIN.

It was reported from Madrid on Feb. 18th that the Spanish Postmaster-General, Senor Francos Rodriguez, seconded by the president of the French Aeroplane Syndicate, who is at present at Madrid, is organising a flying post between the principal Spanish towns.

U. S. A.

A decision to undertake the construction of a large rigid airship on the general lines of a Zeppelin was announced on Jan. 15th by Secretary of the Navy Daniels and Secretary of War Baker, as the result of the recommendations of a joint army and navy board, which has been studying the problem. The following was the official announcement:—

"A joint committee of army and navy officers representing the aeronautical branches of both Services, the General Staff of the army and the General Board of the navy, after a study of the question of rigid airships, has recommended that the construction of a large airship on the general Zeppelin type be undertaken at once under the direction of the chief constructor of the navy, and has also recommended that to successfully prosecute this work and secure the most effective co-operation a joint technical board, composed of the chief constructor of the navy, as senior member, and three officers from each of the two Services as members, be appointed.

"These recommendations have been approved by the Secretary of War and the Secretary of the Navy, and plans for undertaking this work immediately are being worked out. The cost of construction will be borne equally by the army and the navy from appropriations made by the Sixty-fourth Congress.

"The importance of the rigid airship for military and naval purposes is fully realised, and it is believed that the problems involved can be worked out better, more rapidly, and more economically by joint action than if each Service took them up separately."

THE ZEPPELIN QUESTION.

The following message was sent from New York on Feb. 19th: One of the Associated Press correspondents lately in Germany, telegraphing from Geneva, says that the cessation of air raids on London was the outcome of a deliberate decision of the German authorities that the Zeppelin campaign against the British capital was bad business owing to the increasing strength of the London air defences. The correspondent adds, however, that the decision was, perhaps, not altogether unconnected with the effect of such raids on neutral opinion. He proceeds:

In this connection it may be interesting to publish a bit of the unwritten history of the war. In the early days of the conflict, when air raids were just beginning, President Wilson caused to be conveyed to the German Government and to the Emperor a personal unofficial message of a character which, between European Sovereigns, is often more effective than official communications, intimating that Zeppelin and aeroplane raids upon populous cities were looked upon with disfavour by the American people, and contributed largely to stirring up and augmenting anti-German feeling in the United States. He therefore suggested the wisdom of their discontinuance.

The suggestion fell upon not entirely deaf ears, but the views of the military party prevailed, and the air attacks, then the only German means of bringing home the realities of the war to the population within the Isles, continued. They ceased later for a time, to the intense disgust of the advocates of ruthlessness, but were resumed with the object of tying up within the Islands and eliminating from the Somme offensive as large a number of anti-aircraft guns, aeroplanes, searchlights, and men to man them as possible. Apart from this object, which is of prime military value, the rôle of the Zeppelins in land warfare is now regarded in expert circles in Germany as decidedly secondary to their great value as scouting agents in fleet operations.

[One is naturally suspicious of the wily Hun when he spreads such confessions of failure by way of neutral countries. It would be safer to assume that the whole story is an attempt to put our Home Defence Forces off their guard. Happily the anti-aircraft gun service, the aircraft observation service, and the Home Defence section of the R.F.C. are all under the command of very able officers, so there is little chance of their being caught napping.

Incidentally an ingenious reader of The Aeroplane has evolved the theory that every important Zeppelin raid is preceded by an aeroplane raid on the South-East coast, and that the reports of such an aeroplane raid circulated throughout the country in official communiqués are the signal to all good Germans in England to keep under cover, or to get their signalling apparatus ready, as the case may be, on any immediately succeeding night which may be suitable for airship raids. The idea may be worth official investigation.—C. G. G.]

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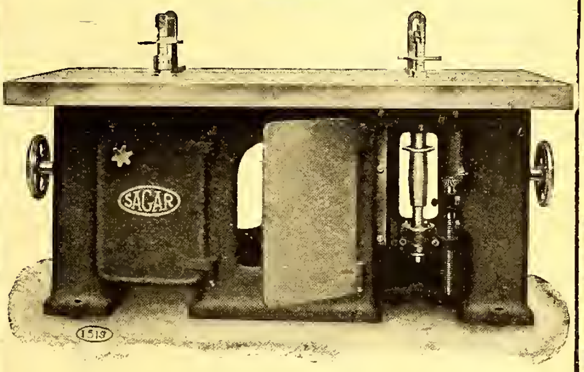

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A Life and the Future.

It is to be hoped that some day Mr. Pemberton-Billing, having attained to mature age and considerable affluence, and retaining his curiously photographic memory, will write a book on his life, for the skeleton sketch he has given of it in his highly entertaining paper, "The Imperialist," merely whets one's appetite for more. Odd, though it may seem, his natural modesty would probably be the chief bar to the production of such a work, for it is well to remember that even in the heat of his hard-fought elections one heard very little from his own mouth about what he had done, but a great deal about what other people ought to do, and might have done, and had not done.

Even his "life," as set forth, under pressure of misrepresentation by others, in "The Imperialist" has nothing of self-satisfaction or self-exaltation about it, and, despite the inevitable constant use of the personal pronoun, first person singular, one has the impression that he is sitting outside himself as a rather interested and considerably amused spectator of his own extraordinary career. The filling in of the details of the incidents related in his present sketch would make a healthy volume, and there are many other incidents, by no means discreditable to himself, entirely omitted. For instance, there are the stories of how he nearly bought the Siamese Navy and sold it to a Russian Princess, and of how he "cut out" a unit of the German Naval Reserve from a Mediterranean port, and returned it to its rightful British owner. And there are certain adventures in the present war, of which many an even more modest man might well boast, which he has not even indicated.

His reason, not his excuse, for devoting whole issues of "The Imperialist" to his personal history, is that as his variegated past has been raked up by political enemies and thrown at him in the effort to discredit him in the eyes of his constituents, he felt it his duty to his friends and supporters to explain how and why he has been at various times a stowaway, a bricklayer, an actor, a policeman, a soldier, a journalist, a working mechanic, and a member of sundry other professions which his opponents appear to regard as equally discreditable. Curiously enough they have omitted to charge him with being a politician and a member of Parliament.

On the whole, the history, even in its present sketchy form, makes most joyous reading, and those who have not read it can doubtless obtain the three numbers containing the autobiography for as many pence from the office of "The Imperialist," in that hot-bed of Billingism, or Imperialism, the town of Hertford,—which, strange as it may seem to his enemies, still retains its faith in his honesty of purpose. Certainly, those who have read the attacks on his career owe it to themselves to read equally his defence.

The Light of History.

Apparently, some of those who cannot help feeling a sneaking regard for his aims and accomplishments, though seemingly they feared to incur official displeasure by openly allying themselves with him when he was most vehemently attacked, are of the opinion that he has been misguided in his recent campaigns by "new friends." The idea of anyone guiding Mr. Pemberton-Billing anywhere is humorous to those who know his impetuosity and intensity of purpose, and if one regards his political career in the light of history it is very doubtful whether he has been misguided at all, even by himself.

History teaches us that all great reforms follow on certain set lines. The oppressed, or the misruled, or the misorganised, plead for a better state of affairs. A few eminently respectable and gentlemanly people champion their cause and ask for reforms in a quiet, respectable way. Nothing happens. Evils increase rather than decrease. Then there arises a fanatic or a number of him, who demands still greater reforms with threats of violence, or of revolution, or of exposure of those in authority. After a while the fanatic is imprisoned, or exiled, or shot, or burnt at the stake, or hanged, or crucified. Then the quiet, respectable people ask for the same reforms as before in the same gentlemanly way. Then the High Authorities say, in effect, "Dear Us! What mild and gentlemanly reforms are these, which are so respectably requested! Let them be granted." And there the matter ends till more reforms are needed, and the process has to be repeated.

One can trace the process in a great many strikes, in almost every extension of the franchise, in all political revolutions, in Irish land reform, in Russia's partial emancipation of the lower classes, in the Reformation of the Church—if one cares to consider it a reformation; in the freeing of Nonconformists from priestly domination—if one considers them free; in the history of Christianity, and in practically any other reform one cares to study. Always the extreme reformer suffers, and the respectable reformer gets what he would not have got except through contrast with the extremist. Contemporary history is ever a blatant plagiarist.

Prophetic Instinct.

However, the main thing evident from Mr. Pemberton-Billing's autobiography is his boundless energy, and his versatility as an inventor, both of schemes and mechanisms. His "Endowment by Increment" scheme antedated by years and still excels in possibilities the patched-up State Insurance scheme at present in force, and so generally disliked. His minor inventions, such as cigarette machines, type-writers, motor-car bodies, gramophone recorders, and so forth, show extraordinary mechanical ability. And his aeroplanes designed since the war proved that he has lost none of his inventiveness.

A Government official of considerable experience, discussing these same machines with me not very long ago, remarked:—"P.-B. has never built a decent aeroplane, but he has built some most astonishing mock-ups." Perhaps I may explain that a "mock-up" is a more or less full-scale working model of any mechanism, put together roughly in order to demonstrate the possibilities of the real thing.

In a way, this official spoke truly, for the original "P.-B." machines (I forget their numeration) were not highly finished examples of the aeroplane builder's art, but—and this is the important thing—they had performance.

Definite Performance.

His little single-seater tractor, built within a few weeks of the outbreak of war, did close on 80 miles an hour—if not more—with a 50-h.p. Gnome engine. If it had been adopted it would have been of the greatest value as a "chaser" to drive away Hun "Tauben," and to protect our own scouts. It was designed for that purpose, but the need for "chasers" was not officially realised till much later. It could have been produced quickly, and there were plenty of 50-h.p. engines to be had for it, whereas we were forced to wait for bigger engines.

Similarly, his funny little "pusher" fighting biplane, nicknamed the "Push-Prodge," was produced in 1915, long before any single-seater pusher fighter was officially adopted, and I believe its performance with an 80-h.p. Le Rhône exceeded that of later machines with 100-h.p. engines. I hear that after many vicissitudes, such as cancelling and renewing of orders, and alterations in the types of engines specified, these machines, which might have been fighting the Fokker Scourge in November, 1915, are now being delivered for use as school machines.

The famous multiple-engined "Night-Hawk" was similarly delayed, by the inability of the Air Department to make up its mind, and the Air Board might do worse than call for the first technical report on this machine. If the Board should do so, it should be careful to get the *first* report, and not any later report, which may, or may not, have been modified to suit the wishes of those then in power.

Now the point is, all this superabundant energy and ingenuity ought to be helping directly to win the war, instead of merely in fighting official mistakes. As one of Mr. Pemberton-Billing's erstwhile enemies, who became one of his "new friends" when I heard the truth about his part in the Friedrichshafen raid from others who took part in it, I know how valuable he might be if properly used.

Clean Patriotism.

Also I know that he is not out for personal gain or kudos. If he were out for money, he might be making his tens of thousands a year as a quiet and gentlemanly aeroplane manufacturer. And, as for kudos, did anybody ever see him, when in the R.N.A.S., wearing his South African war ribbons? Which, incidentally, might have been used to some advantage in impressing senior officers who had seen no war service.

For some curious reason he preferred to work on pure unaided personality, just as he fought the East Herts election with not only the Boraston letter in his pocket, but also the letter from Sir John Rolleston, the previous M.P., giving his real reasons for resigning. Though those letters would have made his election a certainty, he preferred to fight clean without them, and he only disclosed the Boraston letter when safely in the House of Commons. A quaint personality, is it not?

Lately, certain papers have been jeering at him because he has not resigned his seat, as was his first impulse after the attacks on him during the "Globe" action. I write of personal knowledge, and not of hearsay, when I say that certain influential supporters in his constituency came and begged him not to resign, lest the Coalition—not Mr. Lloyd George, please understand—should so work things that the writ for the new election should not be issued, and thus East Herts should be disfranchised in the effort to muzzle Mr. Pemberton-Billing by keeping him out of the House of Commons as long as possible.

Common-Sense Expedience.

It must be understood that his firmest supporters in the constituency are men who cannot support him openly, for professional or business reasons. Therefore, he was persuaded, considerably against his pugnacious will, to ascertain the feelings of his constituents before flouting his supporters by resigning without their permission. The result has been a series of singularly successful meetings, open alike to enemies and friends, in which he has been received with greater enthusiasm than ever he was during his

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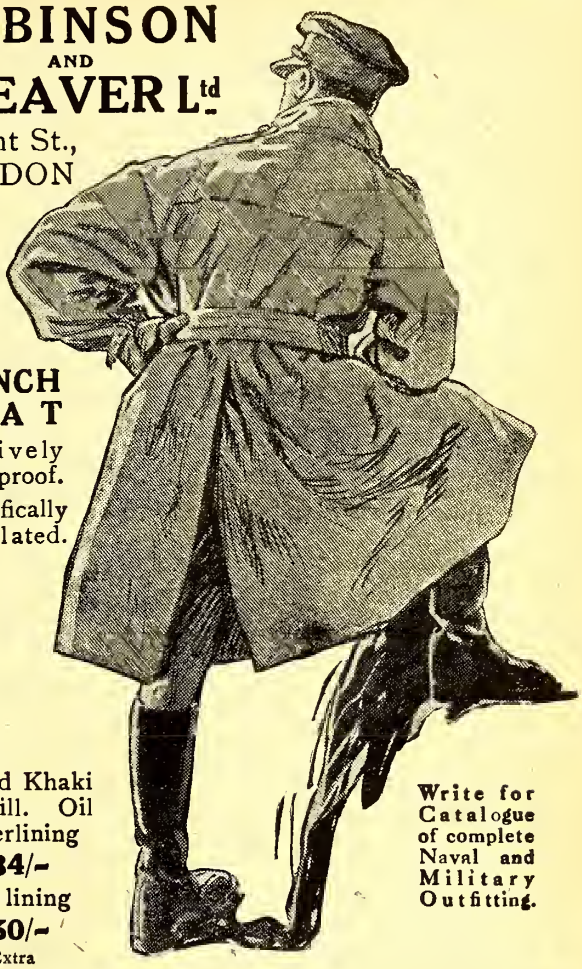

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candidature before the last election. Under such circumstances, why resign and risk political trickery?

Future Usefulness.

It now remains to be seen whether those concerned with Service aviation will so far depart from precedent as to make use of Mr. Pemberton-Billing's ability instead of throwing away what might prove to be valuable ideas. There is no question of offering him any official post. Nor is there any question of orders for his aeroplanes, because he is not now in the Aircraft Industry. It is purely a matter of whether someone connected with the Air Board is a big enough and strong enough man to forget that Mr. Pemberton-Billing has anything to do with politics, and to remember that he is a very clever organiser and mechanical engineer, whose ideas may be used quite unofficially and free of all cost to the nation to help in winning the war.

Finally, let me state clearly that I make these statements apart from any collusion with Mr. Pemberton-Billing, and entirely because of my knowledge of the man and his whole-hearted patriotism,—or Imperialism, if he likes the term better.—C. G. G.

A CHANGE OF NAME AND ADDRESS.

It should be noted that from Monday, Feb. 19th, the address of Blériot Aeronautics is Blériot and Span Aircraft Works, Addlestone, Surrey; telephone, Weybridge 353.

The work done by M. Norbert Chéreau, who has been manager of the Blériot firm in England since 1910, has undoubtedly contributed greatly to the supply of aircraft for the Allied armies since the war, as well as to the popularising of aviation before the war.

The Spad biplane is one of the finest small aeroplanes in the world, and the British Blériot firm is to be congratulated upon having decided upon its production in this country.

The initials S.P.A.D. stand for Société Pour Aviation et Dérives, and the machine is designed by the famous M. Béchereau, who designed the wonderful Deperdussin monoplane which covered 120 miles in an hour in 1913. The curious coincidence of names which decrees that Chéreau and Béchereau should be jointly responsible for the latest Franco-British machine may be taken as a happy augury. One wishes M. Chéreau every success in his latest development.

A FIRM'S AFFAIRS.

The following letter has been received from Messrs. Osborn and Osborn, of 2, Coleman Street, London Wall, E.C., and is published at their request :—

Dear Sir,—Re General Aviation Contractors, Ltd.

In your previous issues you have referred to meetings and resolutions that were passed relative to the voluntary winding-up of this company, and reference, we are instructed, was also made to our client, Mr. D. L. Santoni, who was the managing director of this company. We have now been instructed to write you that Mr. Santoni presented a petition for the compulsory winding-up of this company, so that all affairs connected with the company might be fully investigated by a Public Official, and that on the adjourned hearing of the petition which was heard on Tuesday, the 13th inst., before Mr. Justice Astbury, an order for the compulsory winding-up of this company was made on the petition of Mr. Santoni, notwithstanding such petition was opposed by the liquidator on behalf of the company. We trust you will see your way to publish this fact, as otherwise a wrong impression might be inferred if only previous proceedings were published and not the final proceedings.

SCENES IN AN AIRCRAFT FACTORY.—VI.—THE RUSH FOR THE WAR LOAN. Great enthusiasm prevails and there is a struggle to reach the window of the pay-office where forms are issued An operative faints in the crush. Those who applied early (left top corner) gloat over their prizes. A successful applicant, who has extricated himself somewhat dishevelled (left centre) asks for an explanation of the terms of investment from one of the office "brains," while two others (centre) seated on the ground, puzzle it out for themselves. In the right foreground one of the shop boys regrets his inability to invest. In the middle foreground a survivor of the crush collects his thoughts before facing the mathematics of the subject. And in the left foreground, two women workers demonstrate their common womanhood, their sistership in patriotism as in adversity, and the burial of class distinctions in war work, by pooling their savings in a joint investment.

ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of THE AEROPLANE. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

READERS BY THE HUNDRED.—If you want any information about joining the R.F.C., write to the Director of Military Aeronautics, Adastral House, Blackfriars, E.C.

If you want any information about joining the R.N.A.S., write to the Air Department, The Admiralty, Whitehall, S.W.

Men in the Army, and ratings in the Navy can only obtain commissions in their own branches or transfers to other branches by permission of their immediate commanding officers, who must forward those applications through the proper official channels.

Civilian applicants for commissions in the R.F.C enter through the Cadet Wings, and are trained to fly at the Government's expense.

Applicants for commissions in the R.N.A.S. enter as Probationary Flight Officers, and are trained at Government expense.

If you are blind or partially blind, or have to wear glasses for any serious reason, you cannot become a Naval or Military aviator unless you have some very special qualification.

If you have had special technical training, are over 35 years of age, and attain the necessary social standard, which is not high, you may with luck become a Stores Officer R.N.A.S., or an Equipment Officer R.F.C., even if your sight is defective and you are physically deficient in other respects.

Information concerning appointments as viewers or examiners or inspectors in the Aeronautical Inspections Department may be obtained from the Chief Inspector, A.I.D., Adastral House. Blackfriars, E.C.

Observation of the points indicated above will save a great deal of unnecessary correspondence at the Admiralty, at Adastral House, and at this office. as there is no need to write letters on any point already explained above. The Editor is always pleased to answer questions or explain any points not understood by readers, but space in THE AEROPLANE is valuable, and the same question cannot be answered over and over again week after week. Consequently readers are requested to make quite sure that their questions have not been answered a week or so before.

E. K. (Eastbourne).—Stores Officers, R.N.A.S., are practically the same thing as Equipment Officers of R.F.C. (vide THE AEROPLANE any time during the last month or two).

Numerous ratings in the R.N.A.S. have received commissioned rank, presumably on the assumption that the man who enlisted in the R.N.A.S. early in the war is of a class somewhat superior to the ordinary Naval rating of the pre-war type. This fact naturally makes it more difficult for permanent service men, who are regular Naval ratings, to obtain commissions, but a man who has enlisted for permanent service in the R.N.A.S. since the war should have no particular difficulty in obtaining a commission if he happens to be on good terms with his immediate commanding officer.

L. L. G. (S.A.P., B.E.F.)—1st, 2nd, and 3rd Class E.Os., R.F.C., rank as Captains, Lieutenants, and Second Lieutenants, and draw R.F.C. pay minus flying pay. A 3rd Class E.O. draws about 12s. a day. An officer transferring from the A.S.C. would, of course, draw E.O.'s pay. There is in the Army some small extra pay for interpreters, but this does not apply to every officer who happens to speak a foreign language. It is necessary to pass an examination in order to acquire the said extra pay.

H. H. (Ashford).—Compressed air engines are rather outside the scope of this paper, but doubtless if you write to the Secretary, the Institution of Mechanical Engineers, Great St. George Street, S.W., he would be able to inform you as to the standard works dealing with this species of power plant.

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D. (Willesden Green).—There is provision in the R.F.C. for boy learners from 17 to 19. They are trained as air mechanics, and are eventually transferred to that rank, which is equivalent to private in the Army.

If your son is old enough, the best thing he can do is to go down to the R.F.C. Recruiting Depot at Farnborough and make personal application. He will have to be prepared to sign on for four years and to stop there on the day of his application if necessary.

If you wish your son to receive a commission in the R.F.C., he will have to wait until he is 18, when he may apply for a Cadetship in the R.F.C.

W. A. D. (Whitley Bay).—If, as you say, you applied to the Admiralty for a commission so long as eight weeks ago, it might be well worth while to inquire whether the forms which you sent in arrived safely, because letters are rather apt to go astray in the post at present. The delay in acknowledgment may be due to a large waiting list, but a formal inquiry as to whether the documents have been received or not would probably clear the point up.

H. L. G. (Felsted).—The pre-war Sikorski biplane had four 100-h.p. Argus engines. The machine carried on one occasion 16 passengers, so it is fair to assume that its total useful load was about one ton. It is not permissible to say whether this type of machine is at present being used or not.

T. S. A. (Garnethill).—The smallest aeroplane in the world to carry a man was undoubtedly a monoplane used by M. Santos Dumont during 1909. This was popularly known as La Demoiselle. The machine was 18 ft. in span, with chord of 6 ft. 5 in., the total weight of the machine being 240 lbs., including a 30-h.p. Darracq motor. Naturally it could only be flown by a very light man, and it flew very badly at that, with the result that a lot of people called it the Infuriated Grasshopper. As regards the dimensions, the Caudron monoplane of 1913 and the racing Deperdussins of that year ran it very close. I am afraid I cannot offhand give the dimensions of the Baby Wright aeroplane. It certainly had a bigger wing area than Santos' machine, probably somewhere near double. It had a 50-h.p. engine, and did just over 50 miles an hour. The modern scout aeroplane is naturally a very small machine, but it is not desirable to give details of the very latest types. A notable small modern French aeroplane, particulars of which have already been published, was 24 ft. 6 in. in span, and 3 ft. 11 in. in chord (top plane), and 23 ft. span and 2 ft. 4 in. chord (bottom span), the total plane area being 145 sq. ft.

T. H. J. (Woodford).—As your age is only 16 the best thing you can do is to apply for a job as an "improver" at any of the aircraft factories in your part of London. Whether you remain a mechanic or rise to be a manager must depend upon yourself, and whether you are inclined to improve your education in your spare time after doing your regular work in the shop.

F. F. M. (Wolverhampton).—If you are already employed as a draughtsman and designer you should have no difficulty in obtaining a draughtsman's job in an aircraft factory. Your chances of reaching a more responsible position must necessarily depend entirely on your ability in your present job. If you cannot see any prospect of advancement with your present firm, the most sensible thing to do would be to move to another firm where your knowledge is more likely to be appreciated. There is practically no means of obtaining technical knowledge of aircraft construction except in an aircraft factory.

C. H. E. (West Kensington).—If you wish to make an accurate model of a Fokker monoplane the best thing to do would be to go to Lady Drogheda's Aeronautical History Exhibition at the Grosvenor Galleries, because a full-size Fokker aeroplane is among the exhibits.

T. B. S. (Cambridge).—It is a little bit difficult to see exactly where your photographic experience would be usefully employed in an aircraft works, except possibly in the blue-print department of a drawing office. In view of your long theoretical study of aircraft, it seems just possible that some kind of work might be found for you by an aircraft manufacturer on the administrative side of the business, but this, of course, all depends upon your particular previous experience. The difficulty is that Trade Unions and so forth might try to interfere with you in trying to start as a fitter or other workman.

H. K. P. (Uppingham).—In peace time most aeroplanes which were used for looping had Gnome engines, and as the Gnome engine carburettor has no float chamber, the petrol being fed direct through a needle-valve to a jet placed in a choke-tube, it is obvious that the petrol could not run out of the float chamber, and the mixture was maintained fairly accurately right round the loop, although, as a matter of fact, the engine often spluttered.

In the case of the stationary engine with a float-feed carburettor, as the machine turns upside-down, the petrol in the passage to the jet is generally sufficient to keep the engine turning over, and as the jet turns upside-down with the machine, it is not extraordinary that the petrol comes out of the jet through gravity instead of suction. Moreover, if the loop be correctly performed, centrifugal force acts precisely as does gravity. The accurate running of an aeroplane engine is not essential to the execution of a loop, it being quite possible to execute the feat with the engine shut right off.

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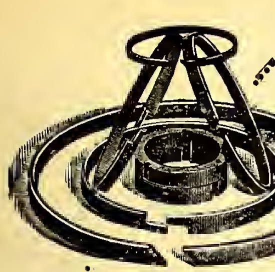

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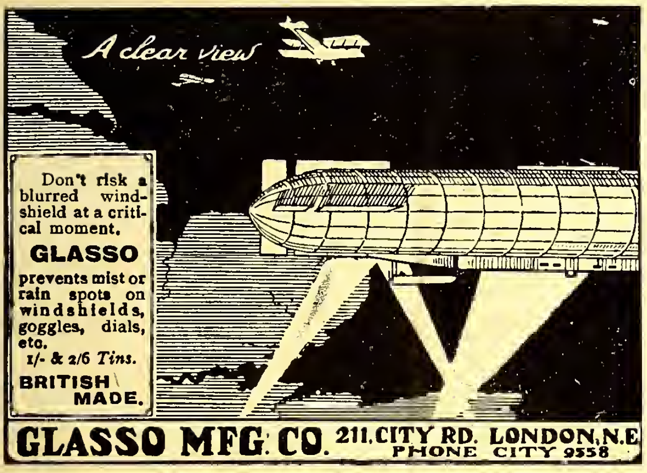

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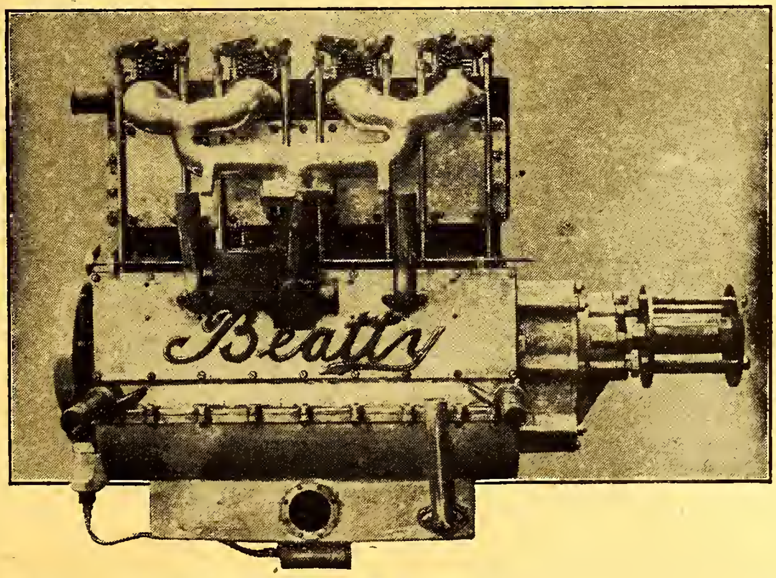

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ON SOME MORE POINTS FOR THE AIR BOARD.

Last week one had the temerity to suggest various little matters which various departments of the Air Board might investigate, with possible advantage to the intensification of aerial warfare, either through accelerating the output of aircraft or by increasing their efficiency. This week one returns to the subject in the hopes that someone in authority will think it worth while to consider the points raised.

It may be well, however, to make it clear that none of these matters are one's own ideas, and that no claim is made to originality. They are merely questions which have cropped up casually in conversation or in correspondence with people more intimately concerned with the use or production of aircraft and their parts.

The Training of Mechanics.

Here is a case in point. It is obvious that Air Mechanics in either Service should have every possible opportunity of learning everything knowable about the engines which they handle or may be called upon to handle. The system of training mechanics in the R.F.C. before handing them over as the finished article to Service Squadrons is believed to be excellent. So far as one can learn, it is less excellent in the R.N.A.S., where it seems to have been the practice to send a newly enlisted mechanic to any station which is short of hands, and leave him there to pick up what knowledge he can from whatever engines may be in use at that station.

There seems, then, to be room for a regular school for mechanics, where they would be instructed in the dissembling, assembling, and repairing of every type of engine used in either Service at that date.

Even where engines are sealed up by the makers, with instructions that the seal is not to be broken except in the presence of one of the maker's mechanics, it would be well to use at least one unsealed engine for demonstration purposes, for there may be a time when it is impossible to obtain either a spare engine to replace the one which has gone wrong, or a civilian mechanic from the maker to put it right. For instance, on Lake Tanganyika, or in Mesopotamia, such commodities might be rare, though a Service mechanic on the spot, who had been educated in the internal economy of such an engine, might easily make it run. Yet a mechanic who did not know the inside of the engine might do it great damage in taking it to pieces.

The Dissemination of Knowledge.

As new types or makes of engines come into use, and as machines so fitted are sent out to active-service squadrons, it stands to reason that the new engines are strange to the mechanics who went abroad with those squadrons six months or a year ago. Consequently it would seem advisable to disseminate knowledge of those engines to the mechanics of such squadrons. The Air Board might well consider what is the custom of the Services in such a matter.

Letters frequently come to this office from mechanics on active service, asking where they can obtain details and drawings of engines of various types. In the endeavour to assist not only Service mechanics but civilian aircraft workers in gaining knowledge of current practice in aero-engine design, this paper has, for the past two years, published detail descriptions and criticisms, with as many illustrations as were obtainable, of all the engines which it was advisable in the national interests to describe.

These articles have been highly appreciated by engine mechanics in both Services, and by many mechanics and engineers in aircraft factories, though they may have seemed dull, or even incomprehensible, to many gallant young flying officers who think of an engine merely as a necessary evil which lets them down at inopportune moments, and gives their mechanics their reason for existence.

There have been, and are, obvious limitations to such articles. One cannot, of course, describe such engines as the latest Sunbeams, or the new Clergêts, or the le Rhônes, or the Rolls-Royces, or the big Beardmores, or the Hispano-Suizas, though actually in use, unless one knows for certain that undamaged samples are in the hands of the enemy. Even then there may be difficulties, because a maker may not care to give away to the designers of rival firms all the internal mechanism of his engine, even if the enemy knows all about it.

Still more obvious is the impossibility of describing the details of such engines as the B.H.P., Smith, Scott, Hart, Wessex, and possible others, which have given excellent performances on test, which contain highly original ideas, but which for one reason or another—in some cases comprehensible and in others quite incomprehensible—have not yet had an opportunity of showing what they can do under active-service conditions.

Official Education.

Only a few days ago a letter was received from the father of an air mechanic, saying that his son is in Egypt and particularly desired to obtain drawings of the R.A.F. and Renault engines, so that he might educate himself more highly in their designs, and asking where they could be obtained. Naturally the only reply possible was that the O.C. that squadron might be able to get them if the said A/M. happened to be on sufficiently friendly terms with his officers to ask the C.O. to ask Adastral House to send them out to Egypt.

One recalls that in the very early days of the R.F.C., if not in the days of the Air Battalion R.E., the late Colonel Fulton, then a Captain R.A., and ever one of the clearest thinkers in the Service, produced an excellent little book on the Gnôme engine for the education of the mechanics who had the handling of that then strange beast. One seems to recollect a similar booklet at a later date on the Renault engine, and there may have been others. It is even possible that much later engines may have been described in like manner, but, if so, it is quite evident that such booklets are not generally circulated among the A/Ms. of both Services.

It seems, therefore, that it would be very well worth while to produce an official book on every engine which is adopted as a standard type, the said book being fully illustrated with drawings and descriptions of the details, and including hints and tips on the running of the particular engine. Such books should be circulated freely to every squadron and station of both Services. They need not be flung about broadcast, especially with paper at its present price, but every A/M. who wishes for a copy should have it for the asking.

Incidentally, he should sign for it, and should be responsible for its safe keeping, so that copies should not too easily reach the enemy. Just that little limitation to the ease of obtaining copies would make them more valued by the owners, and would increase the demand.

Further, mechanics who displayed keenness in obtaining and studying these books would automatically mark themselves higher in the esteem of their officers, as being men who were anxious to educate themselves and to succeed in their profession.

An Extension of the System.

The system, if adopted, might well be extended to aeroplanes also. Some time ago an excellent booklet on the rigging and general design of the 80-h.p. Avro biplane was issued by that firm. It includes a most complete set of sketches of the various fittings, to assist in ordering spare parts, and a mass of information of high value to those handling these machines. It is somewhat luxuriously produced, but it might well be taken as a model to be copied on cheaper lines for circulation to all mechanics in the Flying Services.

Similar booklets on every type of aeroplane used in the Services could be produced without much expense, with the aid of the designers of each machine, and, if that were done, one can readily perceive the amount of education which would be disseminated throughout the Services.

The practical utility of the scheme may be appreciated if one imagines a pilot of, say, one of the very latest de Havillands, or Armstrongs, or Sopwiths, being forced to land by engine failure at an aerodrome abroad, where there were nothing but R.Es. or F.Es. Probably none, from the senior Equipment Officer to the juniorest mechanic, would have the slightest knowledge of the new machine or its engine, and it would be impossible for any of them with certainty to set his engine right or to true up the machine after any slight deterioration such as might be suffered from a bumpy landing in a strange aerodrome.

Doubtless skilled and experienced mechanics might make a fair shot at the job, but there would be much waste of time, and the possibility of actual unseen damage being done, while experiments were being tried with different adjustments, which would be entirely avoided if a "book of the words" were immediately available from store, or if the more intelligent and ambitious mechanics had already had a chance of educating themselves in the details of the new type.

Care in Production.

Naturally great care would have to be taken to ensure absolute accuracy in such publications, but there are officers—and mechanics—in the Flying Services quite capable of producing such work in the best possible way. It is not a job for immature scientists, nor for men with drawing-office experience only. It is pre-eminently work for practical men, and one could name off-hand three or four officers whose experience in the pioneering days of aviation, and whose occupations during that period suit them precisely for this class of work.

Probably very much of the material for such work is immediately available, and only needs collating, sectionising, and editing, to be issued within a very short time. One ventures to suggest, therefore, that a little more work and time expended in this direction might help quite materially to increase the already high efficiency of the R.F.C., and to make the R.N.A.S. a more useful section of the King's Armed Forces. If such work be undertaken, one rather envies those engaged upon it, for the compilation of such information would be a singularly fascinating task.

Matters of Responsibility.

To turn to an entirely different matter, and yet one not altogether dissociated from it, seeing that both have to do with the production of material, one ventures to commend to the Air Board the study of the subject of bringing the two Flying Services more into accord as regards inspection of aircraft.

Some considerable time ago one was so rude as to hazard the opinion that the R.N.A.S. always does the right thing and generally does it the wrong way, whereas the R.F.C. frequently does the wrong thing, but always does it in an eminently correct manner.

For instance, the Air Department R.N. at the beginning of the war instituted the excellent idea of appointing commissioned officers (R.N.V.R.) as inspectors of aircraft, and of investing them with the power to accept or reject material on their own responsibility. Where the idea failed was that in so many cases this responsibility was vested in men who had neither the ability nor the training to justify their appointments. Vast quantities of good material were scrapped in a purely arbitrary manner—so much so, in fact, that one was tempted at times to think that the gentlemen with the wavy stripes did so merely to display the power of their uniforms. Even to-day, though here and there one comes across very able engineers as R.N.A.S. inspectors, there is plenty of room for improvement, both in knowledge and in manners.

Lack of Authority.

The R.F.C., on the other hand, appointed civilian inspectors without any rank, and, although the late Colonel Fulton endeavoured to impress on them that they were there to *pass* material for use and not to scrap it for trivial details, they were not officially invested with the powers of the R.N.A.S. inspectors. As the Inspection Department grew so routine grew with it, until of late the amount of pure paper work in which an R.F.C. inspector is involved is prodigious, while his personal authority seems to decrease.

Colonel Fulton started the A.I.D. on a thoroughly sound basis by appointing as inspectors reliable men of considerable practical knowledge. This method has survived, and it is doubtful whether any Government Department dealing with production of matériel can show a higher average of experience or intelligence among its inspectors. A very large number of them are practical engineers who are thoroughly keen on their work, and desire to increase by all means the output of aircraft.

Accelerating Decision.

The place where reform seems to be needed is in the offices at Headquarters, whether at the Hotel Cecil or at Adastral House to-day one does not pretend to know. In any case, the R.F.C. inspector, whether of commissioned rank—as is now the case in many instances—or not, does not seem to have the authority to decide things for himself, but has to refer to Head Office over many matters on which he is quite competent to decide off-hand. These references appear to involve him in lengthy correspondence, sometimes lasting for weeks, and in any case he may expect four or five days' routine procedure while papers pass from sub-department to sub-department for initials and signatures before he can obtain an official dictum on a matter which he could settle himself in four or five minutes—and perhaps settle with better results.

If one multiplies one of these purely routine delays by the number of inspectors and multiplies the result again by the number of subjects which give rise to such correspondence, one begins to appreciate one reason why a type of aeroplane which might be fighting Huns within six weeks of its approval as a weapon of war ultimately arrives on the scene six months or a year later, when it is obsolescent and when the Hun has something better.

Thus one sees how, though the Army did the wrong thing by appointing civilian inspectors and saddling them with routine correspondence instead of authority, the thing was done in an eminently correct manner by appointing good men who do their best under difficult circumstances—as is the way of the Army.

One hopes, however, that the infusion of the Ministry of Munitions into the Air Board and its offices will alter matters so that the good features of the Inspection Departments of both Services may be preserved and their bad features abolished.

THE MINISTRY'S WAY.

There is rather a charming story told of the Ministry of Munitions in the days of its youth and innocence, which may possibly point a moral and certainly adorns the tale. It was in the early days of the fighting in the Mediterranean or the Garden of Eden, or in one of those other "side-shows" which absorb shipping and seem to lead nowhere in particular, and, of course, it was of little importance, because it was such a long way from Fleet Street. Nevertheless, there were many men engaged, and they wanted something which would go off bang and hurt the enemy, who were more numerous and better equipped than they were. Equally, of course, someone at the War Office had forgotten to send them the things that go off bang.

Consequently, someone else short-circuited a message through to the infantile Ministry of Munitions to send them these things, for the Lord's sake, lots, and very quickly. Therefore yet another someone turned on all sorts of queer people to make these things immediately if not before. And they were made with remarkable rapidity, and were packed, and dispatched, and delivered, and went off bang as intended, spreading death and destruction among enemies, and serpents and apples in the Garden of Eden, or wherever it was.

And presently, when they were getting in their really finest work, and helping to save the Empire, yet again another someone, at the War Office this time, sent a polite and formal document to the Ministry of Munitions, having the honour to request that someone, still yet again another, at the War Office might be informed whether the projectiles which the writer had the honour to understand to be under construction were likely to be ready for inspection by the Ordnance Department—or some such department—before being assembled and loaded.

"Good Lord!" said the Ministry, or words to that effect, "the blamed things have been nearly all used, and there's another lot just arriving, and there's still another lot pretty well ready for dispatch! How were *we* to know you wanted to inspect 'em? We thought the men out there wanted 'em to help win the war!"

What the War Office said about it is not here recorded, but apparently there was some sort of compromise, for it seems that the War Office does on occasion inspect the Ministry's products. But, anyhow, the Ministry's early lack of method has done more to win the war than the War Office's early stereotyped method, so perhaps a combination of the two in the Air Board may produce good results.

And if the Service members of the Air Board do not believe this story, perhaps some of the Munitions people may be able to discover in which department it occurred, because one cannot here write from personal knowledge, but only from hearsay and gossip, which is not evidence, even when known to be true.—C. G. G.

AIRCRAFT IN THE HOUSE.

On Feb. 26th **Sir G. Cave,** answering **Mr. MacVeagh** (S. Down, Nat.), said:—The total number of fatal accidents in the Metropolitan police district during the hours of darkness (i.e., between half an hour after sunset and half an hour before sunrise) between Aug. 1st, 1914, and Jan. 31st, 1917, was 954. The number killed by Zeppelins in the metropolitan police district was 137. The corresponding figures for the City are:—29 fatal accidents and 13 persons killed by Zeppelins.

On Feb. 26th **Captain Burgoyne** (Kensington, N., U.) expressed regret that the House had not an opportunity to discuss the Air Services generally, and that the debate on this vote must be restricted to the Royal Naval Air Service. Great as the expansion of the Navy and the Army had been since the outbreak of the war, the expansion of the Air Services had been infinitely greater in proportion; and when such a development took place, if the problems to be discussed were divided among a number of Departments, the consequence of that system was chaotic cross-currents which were likely to be detrimental to the Services. He mentioned that in 1912 Sir John Jellicoe was so impressed with what he had heard concerning the rigid type of airships that he obtained permission to make several trips in Zeppelins from Berlin.

While he complained that we went from 1909 to 1915, without having a single airship in the air, he admitted that things had distinctly improved. Dealing with the difficulties that arose between the two Services, he said that nearly a year ago the Admiralty ordered a large type of bomb-carrier of a very slow type. After it had been used for a considerable time it was found that the type got slower, so a large series of streamline wires—which it was believed would increase the speed—were ordered at a cost of £6,400. They had no sooner got the wires made than they decided to delete the series. Some of the planes were handed to the R.F.C., who burned the planes and kept the engines.

We had at the present time less than a dozen seaplane-carriers in existence, largely drawn from the cross-Channel service. One of them was absolutely useless, and another was the laughing-stock of the Mediterranean.

He knew of two factories building planes, one working for the R.N.A.S. and the other for the R.F.C. The latter had its planes completed long before the other factory, but engines were lying piled up in a R.N.A.S. shed, and not being used, and that at a time when machines were being called for by the Commander-in-Chief on the Somme. Why should the R.N.A.S. retain an unused reserve of engines when there were planes belonging to the R.F.C. waiting for them? If that sort of thing was going on it was impossible to avoid friction.

He called attention to the case of a pilot of the R.F.C. who was sent from Adastral House to Brooklands, and saw a machine hurriedly covered by tarpaulin. He was told it was a new design for the R.N.A.S., and that "they were hanged if he was going to see the stunts they were putting into it." We were all out to win the war, and he would have thought the first thing the designers of the new machine would have desired would have been to hand over any new ideas they had for incorporation in the machine of the R.F.C.

He hoped much from the new Government and the reconstructed Air Board. Many people looked to a Central Air Service as the proper outcome of our organisation. He moved an amendment to reduce the number of men by 100.

Dr. Macnamara said the general administration of the Naval Air Service had been assigned to the Fifth Sea Lord. He represented the Admiralty on the Air Board; and had direct relations with the Director of Aeronautics at the War Office and the Minister of Munitions. In those circumstances there was complete co-operation and co-ordination between the two arms of the Air Service. That was as it ought to be. This was no time for fighting battles along the Whitehall front. (Hear, hear.) The real front was elsewhere, and on that front there was full scope for the display of all their ability and energy. (Hear, hear.) Their duty was to apply themselves for all they were worth to the prosecution of the war, and they thought it would not tend to that purpose to hand over the personnel of the Naval Air Service to the Air Board.

TRAINING.—VI.

BY "BERKELEY."

In an encounter battle chosen by both opposing forces in the field, the strategic dispositions of the immediate past are, through the medium of tactics, put to the test. Strategy for the time being is in a state of suspension while the fighting soldier is given an opportunity of displaying in practice his tactical skill. When the gods are kind, the battle, if it was that contemplated in the strategy of the higher command, will be decisive in its results, and the campaign will advance another stage, or perchance will end.

All effort in war should be directed towards the battle. Consistent avoidance of the combat may prolong a war, but cannot lead to victory. The Boer States in the war in South Africa had no liking for fighting, and relied on the waiting game, sacrificing in turn each strategic position of importance, until in time the campaign degenerated into a series of border raids of annoying character, but with neither military nor political value. The misery of the inhabitants was increased. That was all.

Defiance as a National Asset.

When in the middle of the last century the Volunteer Force was brought into existence for a second time, but on the latter occasion with some manner of official approval, the leaders of the movement adopted as a motto the most unsoldierly of all phrases, "Defence not Defiance." Not that the blame can entirely be imputed to them, for the nation itself had since the days of Waterloo gradually come to believe that not only was our island formation a great natural defence in time of war, but that it was a sufficient protection against all the ills of international aggression.

The Royal Navy, with its opportunity of proving that "Absence makes the heart grow fonder," became the military idol of the nation, while the Army, unpaid and unbeloved, played the part of a beautiful villain, an accessory in the stage setting, unessential in the national efficiency, but retained that all colour might not be banished the world and that the gentlemen of England should not lack occupation.

So might the cynic read the attitude of the public throughout the Victorian era and until the opening of the present disturbances abroad. At vast expense in money and men, the old Army has been expanded to a size bearing comparison with the greater Continental armies, and Great Britain, and perhaps the world, has been saved. But the expense, the losses, and the delay might all have been avoided if "Defence not Defiance" had not appealed to the sovereign people.

The Benefit of the Offensive.

As in the case of a national policy, so in the matter of a battle the defensive should never be accepted when the offensive is possible. The defensive in its purest form permits the enemy to develop his tactical dispositions in the fullest degree without effective hindrance. The defending force is compelled to respond to the methods of the enemy, and can rarely counteract or alter the designed manœuvres.

The Unavoidable Defensive.

The defensive is rarely chosen deliberately by a commander of determination and skill. It is on occasion forced upon him by external conditions, such as a lack of support and the necessity of holding a strategically valuable position until assistance arrives, or that pressure at other points may be relieved.

It may also be adopted intentionally in order to gain time for the completion of a concentration consequent on the prearranged plans of the higher command. An instance of the latter defensive is that of Napoleon in 1813 halting on the Elbe. Kut-el-Amara perhaps, and Verdun certainly, are instances of the defensive assumed to relieve the pressure elsewhere, quite apart from the necessary consideration of the preservation of *moral.*

The Success of Initiative.

By the assumption of a vigorous and determined offensive the enemy is forced to modify his plans, possibly to such an extent as utterly to destroy cohesion, for a time at least. The success of the initial operation in battle frequently decides the retention of the initiative for the remainder of the combat.

On occasion, when the dispositions are favourable, it may be profitable to await the attack of the enemy if the conformation of the ground, combined with a knowledge of the enemy psychology, or other possible considerations, lead the commander to believe that his opponent will attack at a point and time favourable to the commander gaining the initiative.

Supplement of Manœuvres.

Whether in open warfare or in that at present popular overseas, the forces to be engaged in an encounter battle will for the major part keep in march formation until the last possible moment, in order that the utmost mobility and suppleness of manœuvre may be maintained until battle is joined. The last possible moment may be hours before the moment of attack, or miles from the point of contact.

In trench warfare the additional troops to be employed in the offensive proceed in march formation to the trench area, and deployment is carried out by the entering of the trenches. In open warfare, deployment is carried out in the time-honoured manner, in as close concealment as is available commensurate with being within striking distance of the enemy.

In these days of vast armies and greatly extended fronts, deployment is delayed until the last moment not only to give increased mobility, but in order that the distance over which the troops will have to move in extended order before action is joined may be shorter, and in order that that cohesion should not be lost.

Revealing Concealed Deployment.

As the act of deployment not only reveals the probable intention to attack, but also indicates in some manner the tactical disposition of the army, it is essential that every effort should be made to conceal as much as possible of the movement. It is in this matter that the aeroplane has allotted duties of importance.

The Aeroplane's Duties.

In the days before the action the aeroplane has presumably carried out reconnaissances, both strategical and tactical. It has assisted (in siege warfare) in the registration of artillery, and it has by a constant patrol done much to reduce the aerial activities of the enemy's flying service.

The aviator now has to cover the deployment by carrying out an offensive of his own directed against the enemy aviator. It is not enough to patrol over friendly lines and drive away the over-inquisitive. The

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war must be carried on over the enemy lines, and the enemy aerodromes assaulted with determination and skill.

No enemy pilot ought to pass the cordon unchallenged. He may by his brilliancy and courage defeat his antagonist and discover the secret of the deployment, but that is the fortune of war. All that is asked of an aviator is that he shall do his best, and without hesitation and indecision.

Reconnaissance Work.

Apart from the observations made by the aeroplanes thus primarily engaged in fighting, it will probably be found necessary to have additional machines in the air employed specifically in reconnaissance. Any movements of the enemy, during the period beginning at the time when the troops are moving forward with a view to deployment and ending with the conclusion of the action, should be reported with urgency in the system of warfare now common on the Western front. Such movements may indicate the beginning of a spontaneous attack on the part of the enemy, or may be counter dispositions consequent on the discovery of the opponent's approaching deployment.

The Responsibility of the Aviator.

In open warfare the enemy's movements are naturally of vital interest, especially if he, too, is seeking battle. The reconnaissance of the days before, both on land and in the air, coupled with available knowledge as to the resources and conditions of the opposing army, have probably revealed much of his intentions, but his tactical designs can only be deciphered on the day of action itself. In consequence, there is a heavy responsibility on the flying service as the principle means of bringing rapid and accurate information.

The Demand on the Intelligence.

Possibly reconnaissance at such times will develop into a series of fights between aircraft to the consequent forced neglect of scouting. This situation will continue —if it occurs—until the supply of aircraft on both sides increases to its proper proportion in relation to other arms, or until either force establishes a superiority in the air.

In either event there will be a steadily increasing demand on the intelligence of those who are employed as aerial observers.

Artillery Preparation.

In parallel warfare an action begins with artillery preparation on a grand scale, with the direct intention of clearing the ground for an advance by the elimination of wire and the destruction of important redoubts, of demoralising the enemy in the fire trenches, and of preventing the reinforcing of these trenches.

This preliminary bombardment is based on the previous registration of artillery ranges, and is controlled by aeroplanes to such a degree as is possible under present conditions. What that degree may be or the exact manner of employment will no doubt be laid down in the manuals of the immediate future.

Defensive Registration.

The open battle also begins its intensity with an artillery engagement which is more directly aimed at the destruction of personnel than with a disturbance of the configuration of the ground. Here, too, the aeroplane will assist, and with possibly greater results than in the case of trench warfare, for in the pure encounter battle there is no previous registration to assist, unless, indeed, the army is on the defensive.

Visible and Invisible Targets.

Artillery opening action in strange country, assisted by possibly incorrect maps and with a range of vision limited by the contour of the terrain, must rely for success on pure skill and scientific knowledge. At targets within sight of the battery, or of the observers, there is no difficulty in making excellent practice, provided that the preliminary training has been efficient and thorough.

But even the most brilliant of gunners is unlikely to disseminate damage with precision and charm over an area which, while within range, is completely hidden by intervening contours. His flank observers, equally blinded, are of no assistance.

He may fire over the ridge at what he considers on calculation to be the correct range, and trust to luck that, if the actual tale of damage to the enemy is not extensive, the bombardment will not be without its moral effect. In truth, unless he makes direct hits, which is improbable, his misses will cheer the enemy, while adding to their æsthetic interest in the art of war.

Countering the Invisible.

It is the movements made in this obscurity that are of importance in an encounter battle. What is seen can be countered. What is not seen is provocative of counter dispositions which may be out of all proportion to the urgency of the case. It is therefore of the greatest importance that not only should a commander know of all such enemy movements, but that his artillery, when within range, shall be rapidly and accurately spotted onto the elusive target.

It will probably become possible (or may now be possible and in operation) to allot aeroplanes to brigades or groups of brigades of artillery in the operations of open warfare. The observers employed in these cases could with advantage be gunner officers drawn from the brigades to which the aeroplanes are attached.

THE ROYAL AERO CLUB.

Annual General Meeting.—The annual general meeting of the members of the Royal Aero Club of the United Kingdom will be held on Tuesday, March 20th, 1917, at 3, Clifford Street, New Bond Street, London, W., at 6 o'clock. Notices of motion for the annual general meeting must be received by the secretary not less than 21 days before the meeting, and must be signed by at least five members. The last day for the receipt of notices of motion is Tuesday, Feb. 27th, 1917.

Committee.—In accordance with the rules, the committee shall consist of 18 members. Members are elected to serve for two years, half the committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the committee are:—

Griffith Brewer.
Ernest C. Bucknall.
Flt. Comdr. J. D. Dunville, R.N.
Col. Sir Capel Holden, K.C.B., F.R.S.
Prof. A. K. Huntington.
Sqdn. Com. F. K. McClean, R.N.
Lt.-Col. Mervyn O'Gorman, C.B.
Sqdn. Com. Alec Ogilvie, R.N.
Flt. Com. C. F. Pollock, R.N.

Any two members of the Club can nominate a member to serve on the committee, provided the consent of the member has been previously obtained. The name of the member thus nominated, with the names of his proposer and seconder, must be sent in writing to the secretary not less than fourteen days before the annual general meeting. The last day for the receipt of nominations is Tuesday, March 6th, 1917.

Election of Members.—The following new members were elected:—J. R. Abbott, Granville E. Bradshaw, Lieut. V. F. P. Bryce, R.F.C., Lieut. D. B. Calderwood, R.F.C., W. Barnard Faraday, Latham Hall, Flt. Comdr. Thomas Hinshelwood, R.N., Claude Kirkby, H. C. Lambert, J. D. North, Capt. J. J. O'Neill Power, R.G.A., Charles L. Samson, Capt. T. A. F. McMillan-Scott, K.O.S.B., Lieut. Kenyon Secretan, R.N.V.R., Lieut. F. Ash Yeo, R.N.V.R.

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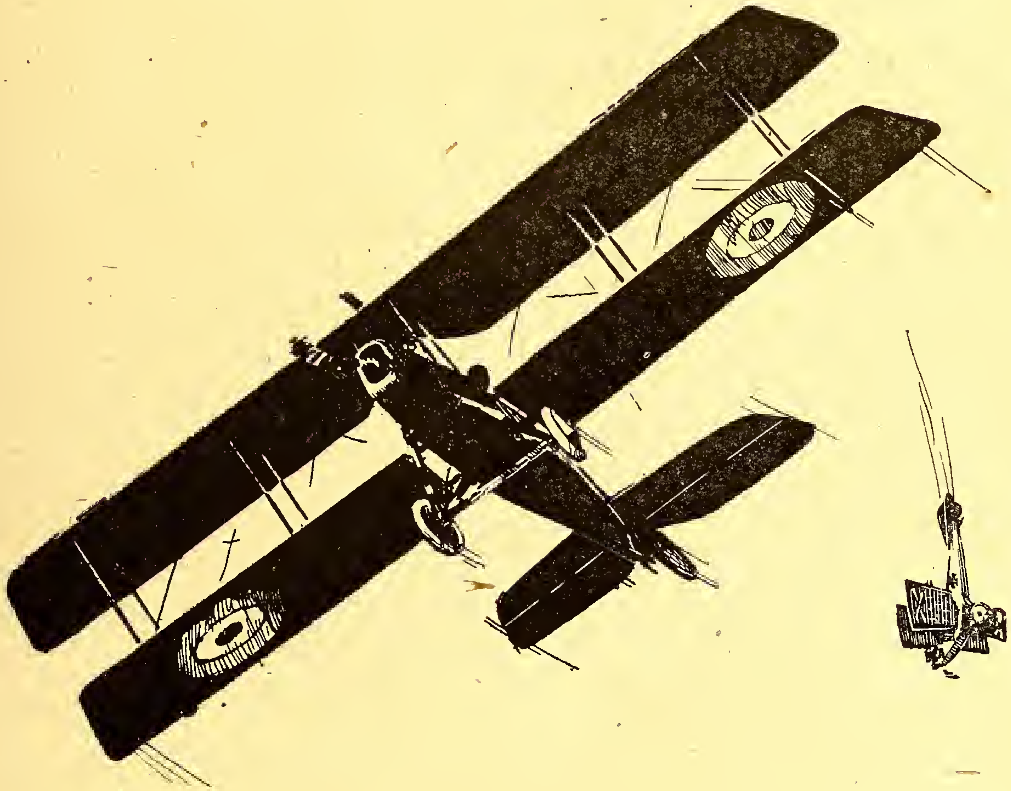
A BRITISH PILOT AND A—



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THE SPANISH AERONAUTICAL SERVICES.

The Aeroplane is enabled, by courtesy of Colonel Señor Don Julio Rodriguez Mourelo, Director of Air Services, to give the following particulars of the development of the Spanish Flying Services, and the Editor expresses his indebtedness to Captain Don Emilio Herrera Linares for sending the information by permission of Colonel Rodriguez.

The Servicio de Aeronautica Militar is commanded by a Colonel-Director and a Second Chief, and has two wings: the Aerostacion Wing, which is concerned with captive and free balloons and airships, and the Aviacion Wing, which is concerned with aeroplanes and hydro-aeroplanes. Both wing are commanded by Comandantes (Majors).

The Parque de Aerostacion (Balloon Yard) is at Guadalajara, and the Aerodromo Central de Aviacion (Main Military Aerodrome) is at Cuatro Vientos (Madrid).

There are five squadrons of land machines in Spain (Madrid, Alcalá, Sevilla, Guadalajara and Cartagena), and one of seaplanes at Cartagena.

In the Spanish part of Morocco are three squadrons (Melilla, Tetouan and Arcila).

Spanish Pilots.

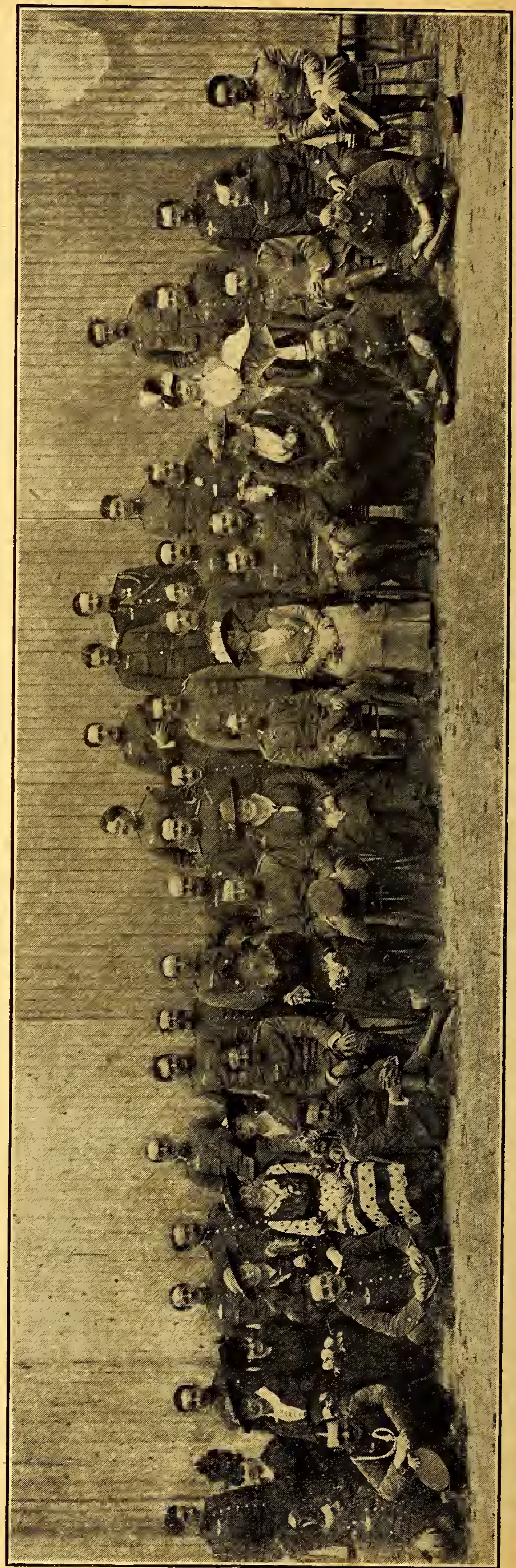
The following are pilots of the First Category, or Class, according to priority of date in qualifying:—

Captain of Engineers, Don Alfredo Kindelan Duany.
Captain of Engineers, Don Emilio Herrera Linares.
Staff-Major, Don Alfonso Bayo Lucia.
Major of Infantry, Don Carlos Alonso Ilera.
Capt. of Infantry, Don Julio Rios Angueso.
Lieut. of Cavalry, Don Angel Martinez de Baños.
Capt. of Engineers, Don Eduardo Barron Ramos.
Med. 1°, Don Antonio Perez Nuñez.
Capt. of Infantry, His Royal Highness el Infante Don Alfonso de Orleans.
Capt. of Infantry, Don Luis Moreno Abella.
Capt. of Infantry, Don Antonio Zubia Casas.
Capt. of Artillery, Don Angel Pastor Velasco.
Lieut. of Cavalry, Don Roberto White Santiago.
Lieut. of Engineers, Don Luis Sousa Peco.
Capt. of Artillery, Don Carlos Cifuentes Rodriguez.
Capt. of Engineers, Don José Ortiz Echagüe.
Capt. of Infantry, Don José Valencia Fernandez.
Capt. of Engineers, Don Genaro Olivié Hermida.
Lieut. in the Navy, Don Juan Viniegra Aréjula.
Capt. of Engineers, Don Fernando Balseyro Flore.
Lieut. in the Navy, Don Francisco Gil de Sola.
Comm. in the Navy, Don Enrique Navarro Margati.
Comm. in the Navy, Don Felix Cheriguini Buitrago.
Capt. of Infantry, Don José Espinosa Arias.
Lieut. in the Navy, Don Pablo Mateo Sagasta.
Lieut. of Infantry, Don Felipe Matanza Vazquez.
Capt. of Cavalry, Don José Gonzalez Camó.
Capt. of Engineers, Don Emilio Baquera Ruiz.
Lieut. of Infantry, Don Apolinar Saenz de Buruaga.
Capt. of Infantry, Don. Juan Vallespín Zayas.
Lieut. of Artillery, Don Luis Lopez de Ayala.
Lieut. of Cavalry, Don Jesús Varela Castro.
Major of Engineers, Don Gonzalo Zamora Andreu.
Capt. of Infantry, Don Julio Balseyro Flore.
Capt. of Infantry, Don Manuel Loma Arce.
Capt. of Cavalry, Don José Romeo Sigler.
Capt. of Engineers, Don José Maria Laviña.
Lieut. of Artillery, Don Pedro Cubillo Avila.
Capt. of Artillery, Don José Gonzalez Estéfani.
Capt. of Engineers, Don Francisco Leon Trejo.
Capt. of Infantry, Don Alfonso Fanjul Goñi.
Capt. of Engineers, Don Alberto Alvarez Rementeria.
Capt. of Cavalry, Don Angel Riaño Herrero.
Capt. of Infantry, Don Joaquin Gonzalez Gallarza.
Lieut. of Artillery, Don Cesar Gomez Lucia.
Staff-Capt., Don Luis Gonzalo Victoria.
Lieut. of Infantry, Don Francisco Martin Prats.
Com. in the Navy, Don Fernando Sartorius y Diaz de Mendoza.
Lieut. of Cavalry, Don Francisco Bustamante de la Rocha.
Staff-Capt., Don José Aymat Mareca.
Capt. of Infantry, Don Antonio Dominguez Olarte.
Lieut. of Artillery, Don Manuel Montero Echeverria.
Lieut. of Cavalry, Don Fernando de la Macorra.
Lieut. in the Navy, Don Pedro Pablo Hernandez.
Capt. of Artillery, Don Manuel Perez Seoane y Diaz de Baldés.
Lieut. of Infantry, Don Felipe Diaz Sandino.
Lieut. of Infantry, Don José Navarro Margati.

The Chiefs of Services.

The following are the Chiefs of the various Aeronautical Services:—

Director of the Air Service: Colonel Señor Don Julio Rodriguez Mourelo (Engineers).
Second Chief of the Service: Lieut.-Col. Don Vicente Garcia del Campo (Engineers).



Officers of the Royal Spanish Air Services, from an Official Photograph published by courtesy of the Director of Air Services, Colonel Señor Don Julio Rodriguez Mourelo.

Chief of Detail of Aerostacion: Lieut.-Col. Don Francisco de Paula Rojas y Rubio (Engineers).
Chief of Aerostacion: Major Don Antonio Cué Blanco (Engineers).
Chief of Aviacion: Major Don Alfonso Bayo Lucia (Staff).
Chief of Detail of Aviacion: Major Don Carlos Alonso Ilera (Infantry).

The Spanish Aerodromes.

The following is a list of the chief Spanish Aerodromes, together with the rank and names of the officers commanding:—

Cuatro Vientos.—Captain of Engineers, Don Emilio Herrera Linares.
Guadalajara.—Major of Engineers, Don Gonzalo Zamora Andreu.
Los Alcázares (Cartagena).—Captain of Infantry, Don José Valencia Fernandez.

The following are the aerodromes in Africa, with their Commanding Officers:—

Arcila.—Captain of Artillery, Don Angel Pastor Velasco.
Tetuán.—Captain of Engineers, Don Emilio Baquera Ruiz.
Zeluan.—Captain of Infantry, Don José Espinosa Arias.

Spanish Flying Schools.

Military School of Aviation.—Cuatro Vientos (Madrid).
National School of Aviation.—Gelafe (Madrid).

The Director of the National School of Aviation is Don Alfredo Kindelan Duany.

Civil School of Barcelona.—Pujol y Comabella y Co.

There is also the Aerodrome of the Sociedad Española de Construcciones Aeronauticas at Santander.

Important Flights.

The most important flights in 1916 made by Spanish military and civil pilots in Spain were:—

Madrid-Tarragona, by Captain Moreno.
Arcila-Sevilla (across the Gibraltar Strait), by Capt. Pastor.
Barcelona-Palma (Balearic Islands), by Hedilla, a civil pilot.

The chief manufacturers of aircraft are: Carde y Escoriaza, at Zaragoza; Pujol y Comabella at Barcelona; Sociedad Española de Construcciones Aeronauticas at Santander; La Hispano Suiza at Barcelona (motors); Elizalde at Barcelona (motors); Baradal y Ereter at Barcelona (motors); and Amalio Diaz at Getafe (propellers).

A MATTER OF ARRANGEMENT.

The following letter has been received, and is reproduced by request:—

"Sir,—The article in your issue of the 24th ultimo anent the findings of the R.F.C. Inquiry Committee and papers attached thereto have been brought to the notice of my directors. There has been much representation in connection with the proposed arrangements between this company and certain other companies. My directors will be pleased to explain the facts when they consider a suitable opportunity has arrived.

"(Signed) For and on behalf of Rolls-Royce, Ltd.,
"John de Looze, Secretary."

THE EXHIBITION OF ZEPPELIN RELICS.

Large numbers of visitors are still attracted to the exhibition of Zeppelin relics in the Temple Gardens. The proceeds of the exhibition, which has been organised by the Royal Flying Corps, are to be given to Military Charities—among others, to the Royal Flying Corps Hospital.

It should be mentioned that the exhibits, while mainly illustrating the aircraft of the enemy include also a number of most interesting aerial photographs taken by British aviators over the trenches. Among these photographs may be mentioned two of Le Mouquet Farm, before and after bombardment.

Another exhibit that attracts much attention is a Beardmore engine, which sustained a direct hit, despite which the pilot contrived to return to the British lines.

THE PROGRAMME OF THE AERONAUTICAL SOCIETY.

Below is given a list of the lectures arranged by the Aeronautical Society of Great Britain. It will be seen that the subjects are of very great interest to all concerned with aircraft, whether as users or as makers, and it is hoped that everyone in the Services and in the Industry who can manage to be present will make a point of attending.

The three lectures which have already taken place have had a highly educative effect, and it must be remembered that, though the lectures are reported as fully as possible in this paper, many technical points are discussed verbally which one cannot report in print owing to the fact that they might be of use to the enemy. Such matters are distinctly of value to newcomers to the Aircraft Industry, who should, therefore, make a special effort to hear the lectures for themselves.

One must cordially congratulate the Council of the Aeronautical Society on having arranged this course of lectures, which will contribute directly to winning the war, and to the establishment of an adequate aerial defence force after the war.

The following have been elected by the Council of the Aeronautical Society:—

Members.—H. Gordon Selfridge, Arthur W. Towse, H. Allsop Dudgeon, A. J. Westlake, A. McCall, E. H. Knight, L. W. Snell, J. W. Miller, H. T. P. Gee, H. Rutherford, J. S. Greig, F. W. Berwick, C. G. Vokes, A. J. A. W. Barr, Sir W. A. Lawrence, The Countess of Drogheda, Miss Margaret Grice, R. O. Cary, Capt. J. H. Brett, Geo. Richard Inshaw, Geo. B. Dunn, A. Lyall, W. Hooper, E. Bartlett, C. H. Watkins, A. P. Donnison, F. W. G. Snook, E. H. Archer, W. W. Hacket, G. N. C. Mann, H. Fulton, H. Waring, H. Bellair, The Countess of Portarlington, The Earl of Drogheda, R. W. Corkling, V. K. Vyvyan.

Associate Members.—R. A. W. Charlton, G. N. Ogilvie, Sir Archibald Denny, Sir Arthur du Cros, J. M. Irving, R. W. Potts, Douglas E. Cook, H. T. Walker, S. Barker, J. S. Whitting, H. C. Newton, H. C. Rowland.

Student Members.—T. Taku, F. L. Richards, F. G. Reddie.

AERONAUTICAL SOCIETY OF GREAT BRITAIN: SYLLABUS, 1917.

Paper Title.	Lecturer	Chairman.	Date.	Hall.
1. Training of Military Fliers.	General Brancker, Director of Aircraft Organisation.	Commodore G. Paine, R.N., Member of the Air Board.	Jan. 24.	Institute Civil Engineers.
2. The Case for the Big Aeroplane.	Mr. Handley Page.	F. W. Lanchester, M.I.C.E., Member of the Advisory Aeronautical Committee.	Feb. 7.	Society of Arts, 8 p.m.
3. The less satisfactory materials of Aircraft Construction.	Capt. Walpole, R.F.C.	Hy. Fowler, Esq., Supt., Royal Aircraft Factory.	Feb. 21.	Society of Arts, 8 p.m.
3a. Fog Conditions.	Major G. I. Taylor, R.F.C., of the Meteorological Office.	General W. S. Brancker, R.A.	Feb. 28.	Royal Automobile Club.
4. Methods of Measuring Aircraft Performances.	Capt. H. J. Tizard, R.F.C. (R.F.C. Testing Squad'n.)	Lord Sydenham, G.C.I.E., F.R.S.	Mar. 7.	Society of Arts, 8 p.m.
5. Commercial Aeronautics.	Mr. G. Holt Thomas.	Lord Cowdray, President, Air Board.	Mar. 21.	Society of Arts, 8 p.m.
6. Magneto Electric Ignition on Aircraft.	Mr. A. B. Young.	Colonel Sir Capel Holden, K.C.B., F.R.S.	April 4.	Society of Arts, 8 p.m.
7. Steel, and Steel Alloys.	Dr. Hatfield, of the Brown Firth Laboratory, Sheffield.	Sir Charles Parsons, K.C.B., D.Sc., F.R.S.	April 18.	Society of Arts, 8 p.m.
8. Meteorological Dangers to Flying.	Capt. C. P. Cave, R.F.C.	Sir Walter Lawrence, K.C.I.E.	May 2.	Society of Arts, 8 p.m.
9. Aero Engines.	Mr. L. Coatalen.	Dugald Clerk, F.R.S.	May 16.	Society of Arts, 8 p.m.
10. Timber.	———	———	May 30.	Society of Arts, 8 p.m.
11. A further three years' flying experience.	Capt. C. B. Hucks.	———	June 13.	
12. Aeronautical Engineers' Education.	Dr. Mullineux Walmsley and Mr. C. E. Larrard.	———	June 27.	

NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Feb. 20th, 1917.

Admiralty, Feb. 15th.

Feb. 19th.—Flt. Sub-Lt. C. N. Leeston-Smith, R.N., who relinquished his commn. on account of ill-health contracted in the Service, to retain his rank.

War Office, Feb. 20th.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed :—Temp. Sec. Lt. (temp. Lt.) H. T. Horsfield, Gen. List, Jan. 17th. Sec. Lt. K. C. McCallum, Arg. and Suth'd Highrs., Spec. Res., Jan. 23rd. Sec. Lt. (temp. Lt.) V. A. Stokes, M.C., Dns., Spec. Res., Feb. 2nd. Capt. E. J. D. Routh, K.R.R., Spec. Res., from a Flying Officer, Feb. 4th. From Flying Officers and to be temp. Capts. whilst so employed :—Sec. Lt. G. J. King, W. York R., T.F., (Feb. 6th. Temp. Lt. R. H. Hood, Gen. List, Feb. 6th.

Flying Officers.—Sec. Lt. H. C. Brufton, Rif. Brig., T.F., Jan. 10th. Temp. Capt. C. O. F. Modin, Gen. List, Jan. 11th. Sec. Lt. (temp. Capt.) A. H. W. Fleming, Norf. R., T.F.; Lt. A. Clear, Manch. R., T.F.; Sec. Lt. R. E. Eversden, Yeo., T.F.; Sec. Lt. F. H. Dear, R. Suss. R., T.F., Jan. 12th. Temp. Sec. Lt. A. C. Stopher, Gen. List, from a Flying Officer (Observer), Jan. 13th, seny. from Nov. 10th, 1916. Sec. Lt. R. W. Reeve, Hereford R., T.F., Jan. 14th. Temp. Capt. W. B. Tisdall, A.S.C., and to be transfd. to Gen. List, Jan. 16th. Temp. Lt. G. E. Hicks, Gen. List, Jan. 18th. Sec. Lt. J. Mundie, Gord. Highrs., T.F., Jan. 21st. Sec. Lt. K. C. Horner, W. York R., T.F., Jan. 25th. Temp. Lt. F. C. B. Douglas, Rif. Brig., and to be transfd. to Gen. List; Temp. Sec. Lt. J. H. Cross, Gen. List, Jan. 27th. Lt. G. R. Taylor, Beds R., Spec. Res., and to be secd.; Temp. Sec. Lt. G. A. D. Hancock, Gen. List, Jan. 28th. Sec. Lt. P. Pike, Devon R., T.F.; Sec. Lt. G. E. G. Round, Divl. Sig. Co., R.E., T.F.; Sec. Lt. A. S. Hett, Spec. Res.; Temp. Sec. Lt. E. L. Prichard-Evans, Gen. List; Sec. Lt. (temp. Lt.) E. S. C. Brooks, Lond. R., T.F.; Lt. W. F. Lees, Canadian Engrs.; Temp. Sec. Lt. S. N. Pike, attd. S. Lan. R., and to be transfd. to Gen. List, Sec. Lt. V. L. A. Burns, R.F.A., T.F.; Temp. Sec. Lt. H. E. K. Eccles, Gen. List, Jan. 29th. Temp. Lt. G. A. F. Layton, Gen. List, from a Flying Officer (Observer), but with seny. from Nov. 22nd, 1915; Sec. Lt. J. E. de Watteville, Cam'n Highrs., T.F.; Temp. Sec. Lt. A. P. Matheson, A.S.C., and to be transfd. to Gen. List; Temp. Lt. H. Blackman, Durh. L.I.; Temp. Sec. Lt. G. Howe, Gen. List, Jan. 30th.

Equipment Officers, 2nd Cl.—Sec. Lt. (temp. Lt.) H. H. Thomas, R.F.A., T.F., from the 3rd Cl., and to retain his temp. rank while so employed. From the 3rd Cl., and to be temp. Lts. while so employed :—Sec. Lt. A. J. Rickie, Spec. Res.; Temp. Sec. Lt. G. F. F. Collender, Gen. List; Temp. Sec. Lt. W. J. Cooper, Gen. List; Sec. Lt. G. E. Upton, Spec. Res.; Sec. Lt. R. J. Copley, Spec. Res., Feb. 1st.

Memoranda.—To be temp. Capt., Gen. List :—Temp. Capt. C. O. F. Modin, from R. Mar., for duty with R.F.C., Jan. 11th.

To be temp. Capts. (without the pay and allowances of that rank) :—Temp. Lt. S. B. Smith, Gen. List, a Flying Officer, R.F.C., whilst specially employed.

Sub-Lt. G. E. Hicks, from R.N.V.R., to be temp Lt. on Gen. List for duty with R.F.C., Jan. 18th.

To be temp. Sec. Lts. (on prob.) for duty with R.F.C. :—Sub-Lt. J. E. Burgess, from R.N.V.R., Jan. 14th. C. W. Waitt, Jan. 22nd; W. A. Huntley, Jan. 25th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Sec. Lts. (on prob.) are confmd. in their rank :—F. Cain, L. Crooks, A. S. Hett, E. W. Walford, F. A. Woolfe. To be Sec. Lts. (on prob.) :—R. R. Byrne, G. R. Cobb, Feb. 3rd. T. D. Bucknill, Feb. 6th.

TERRITORIAL FORCE.—Infantry.—Devon R.—Sec. Lt. P. Pike is secd. for duty with the R.F.C., Jan. 29th.

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From the "London Gazette" Supplement, Feb. 21st, 1917.

War Office, Feb. 21st.

REGULAR FORCES. — Establishments. — R.F.C. — Flt. Comdrs.—From Flying Officers, and to be temp. Capts. while so emplyd. :—Lt. the Hon. J. H. B. Rodney, Rif. Brig., Spec. Res., Nov. 1st, 1916; Lt. G. H. Bowman, R. War. R., Spec. Res.; Lt. G. de L. Wooldridge, Spec. Res.; Lt. E. H. Pullinger, Spec. Res.; Sec. Lt. S. N. Cole, Spec. Res., Jan. 1st; temp. Sec. Lt. (temp. Lt.) S. K. Muir, Gen. List; Sec. Lt. J. Bell, Spec. Res., Jan. 14th; Capt. (temp. Maj.) R. H. Howell, Ind. Cav., from a Flying Officer, Feb. 1st From Flying Officers, and to be temp. Capts. whilst so empld. :—Temp. Sec. Lt. E. R. Manning, Gen. List; temp. Sec. Lt. C. J. Truran, Gen. List; Sec. Lt. W. L. Hay, Spec. Res.; Sec. Lt. J. O. Leach, M.C., Midd'x R.; temp. Sec. Lt. J. Palethorpe, Gen. List.

Flying Officers.—Sec. Lt. J. E. Taylor, R.E., T.F., Jan. 13th (substituted for notification in "Gazette" of Feb. 1st; temp. Sec. Lt. J. E. Addinsell, Gen. List; Sec. Lt. C. R. Duggan, Spec. Res.; Sec. Lt. (on prob.) N. T. Croft, Lond. R., T.F.; temp. Sec. Lt. F. Roux, Gen. List, Jan. 27th; temp. Capt. C. B. Tidmarsh, Wilts R., and to be transfd. to Gen. List; Sec. Lt. (temp. Lt.) E. R. Kerrison, Norf. R., T.F.; Sec. Lt. C. H. Beldam, Camb. R., T.F., Sec. Lt. R. C. Hardie, D. of Corn. L.I., Spec. Res., and to be secd.; temp. Sec. Lt. L. W. Beal, Gen. List; temp. Sec. Lt. J. J. Paine, Gen. List, Jan. 28th; temp. Capt. H. G. Southon, Gen. List, Jan. 30th; temp. Lt. W. H. Legge, Gen. List; Sec. Lt. E. W. Lindley, Manch. R., T.F.; Sec. Lt. V. Wigg, Lond. R., T.F.; Sec. Lt. (on prob.) N. D. Armstrong, Som. L.I., S.R., and to be secd.; Sec. Lt. (on prob.) G. M. G. Bibby, Gen. List; temp. Sec. Lt. D. Townsend, Gen. List; Sec. Lt. A. D. K. Perkins, R. Ir. Fus., and to be secd.; Lt. (temp. Capt.) C. T. Vachell, Mon. R., T.F.; Sec. Lt. R. M. H. Young, R. Scots, T.F.; temp. Sec. Lt. G. H. Haydock, High. L.I., and to be transfd. to Gen. List; Sec. Lt. J. A. I. Watts, D. of Corn. L.I., and to be secd.; Capt. C. T. Holmes, R. War. R., Spec. Res., and to be secd.; Lt. S. R. P. Walter, R. W. Surr. R., from Machine Gun Corps, and to remain secd.; Sec. Lt. (temp. Lt.) T. E. Salt, R. War. R., T.F.; Sec. Lt. C. Turner, Worc. R., from a Flying Officer (Observer), but with seny. from June 21st, 1916; temp. Sec. Lt. H. J. McCracken, attd. Ches. R., and to be transfd. to Gen. List; temp. Sec. Lt. (on prob.) F. R. Maugham, Gen. List; temp Sec. Lt. (on prob.) S. G. Knock, Gen. List; Sec. Lt. E. R. Bottomley, R.F.A., T.F.; temp. Sec. Lt. E. M. Roberts, Gen. List, from a Flying Officer (Observer), but with seny. from April 16th, 1916, Jan. 31st; temp. Lt. G. K. Smith, attd. York R., and to be transfd. to Gen. List; temp. Sec. Lt. C. B. Dolphin, A.S.C., and to be transfd. to Gen. List; Sec. Lt. G. I. Wilson, Yeo., T.F.; temp. Sec. Lt. H. C. Duxbury, Gen. List; Sec. Lt. J. A. Boret, R.W. Surr. R., T.F., Feb. 1st; temp. Sec. Lt. J. Harper, Gen. List, Feb. 2nd; temp. Sec. Lt. H. P. Dean, S. Staff. R., and to be transfd. to Gen. List, Feb. 3rd; Sec. Lt. C. E. W. Chapman, R.F.A., T.F.; temp. Sec. Lt. (on prob.) H. Sanders, attd. N. Lan. R., and to be transfd. to Gen. List, Feb. 4th; temp. Sec. Lt. (on prob.) J. K. Ross, Gen. List; temp. Sec. Lt. (on prob.) E. D. Soar, Gen. List, Feb. 5th; Sec. Lt. St. C. C. Tayler, R. Suss. R., and to be secd.; temp. Sec. Lt. J. W. Sheridan, attd. Cam'n Highrs., and to be transfd. to Gen. List, Feb. 6th.

Park Comdrs.—And to be temp. Majs. while so empld. :—Lt. (temp. Capt.) C. P. Ogden, Spec. Res., from an Equipt. Officer, 1st Cl.; Lt. (temp. Capt.) C. Hirtzel, Spec. Res., from a Staff Capt.; Sec. Lt. (temp. Capt.) R. S. Rumbold, Som. L.I., from an Equipt. Officer, 1st Cl., Feb. 1st.

Equipt. Officers, 1st Cl.—From the 2nd Cl., and to be temp. Capts. while so empld. :—Lt. R. K. Pillers, North'n R., Spec. Res.; Sec. Lt. (temp. Lt.) T. Bullen, Som. L.I.; Sec. Lt. (temp. Lt.) E. G. A. Lefrere, Spec. Res., Feb. 1st.

2nd Cl.—From the 3rd Cl.—Temp. Sec. Lt. E. R. Moxey, Gen. List, and to be temp. Lt. while so empld., Dec. 30th, 1916; temp. Capt. R. F. Stapleton-Cotton, Gen. List, Jan. 1st; Lt. J. E. Marriott, Spec. Res., Jan. 31st; Lt. B. W. Watts, Spec. Res., Feb. 8th. From the 3rd Cl., and to be temp. Lts. while so empld. :—Sec. Lt. L. J. Stuart, Spec. Res., Feb. 8th; temp. Sec. Lt. W. Scott, Gen. List, Feb. 13th.

3rd Cl.—Temp. Sec. Lt. M. F. W. Sampson, Gen. List, Dec. 3rd, 1916; temp. Sec. Lt. C. P. H. Gunyon, Gen. List, Dec. 4th, 1916; temp. Sec. Lt. (temp. Capt.) B. T. Hood, Sco. Rif.; Sec. Lt. (temp. Lt.) A. J. Elliott, R.F.C., T.F., Feb. 5th; Sec. Lt. V. Stranders, R.F.A., T.F.R., Feb. 8th.

Corps of Royal Engineers.—Lt. F. W. M. Herring, R.E., T.F., to be actg. Capt. whilst commanding an Anti-Aircraft unit, Dec. 14th, 1916.

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From the "London Gazette" Supplement, Feb. 22nd, 1917.

War Office, Feb. 22nd.

REGULAR FORCES. — Establishments. — R.F.C. — Sqdn. Comdr.—Sec. Lt. (temp. Capt.) L. A. Tilney, Household Cav., from a Flt. Comdr., and to be temp. Maj. whilst so empld., Feb. 13th.

Flying Officers.—Lt. W. P. Eastwood, Canadian Gen. List; Sec. Lt. (on prob.) D. Gordon, Arg. and Suth'd Highrs., T.F., Jan. 29th; Sec. Lt. (on prob.) L. A. Tapper, Spec. Res., Jan. 30th; Sec. Lt. (on prob.) A. M. Lewis, R.G.A., Spec. Res.; Sec. Lt. E. Pownall, L'pool R., T.F.; Sec. Lt. R. E. Kimbell, Hrs., and to be secd.; Sec. Lt. (on prob.) V. M. Bowling, Spec. Res.; Lt. A. B. Raymond, Canadian A.S.C.; temp. Sec. Lt. A. W. Gardner, Gen. List, Jan. 31st; Sec. Lt. C. T. Travers, Wilts R., and to be secd.; Sec. Lt. A. T. Strange, E. Kent R., T.F.; temp. Sec. Lt. (on prob.) E. Mannock, R.E., Feb. 1st; Sec. Lt. G. T. Brown, Welsh R., T.F., Feb. 2nd; temp. Sec. Lt. A. P. Warren, Gen. List; Sec. Lt. H. E. R. Twamley, Notts and Derby R., and to be secd., Feb. 3rd.

Equipt. Officers, 2nd Cl.—From 3rd Cl.—Sec. Lt. (temp. Capt.) P. L. Hunting, North'd Fus., T.F.; Lt. F. A. Klipsch, T.F. Res.; Lt. G. Somers-Clarke, Spec. Res. From 3rd Cl., and to be temp.

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Lts. whilst so empld. :—Sec. Lt. R. N. Rowell, Spec. Res.; Sec. Lt. L. Stones, Spec. Res.; Sec. Lt. A. Young, Spec. Res.; temp. Lt. H. Fernihough, Gen. List, from 3rd Cl. From 3rd Cl., and to be temp. Lts. whilst so empld. :—Sec. Lt. B. M. Iles, Spec. Res.; temp. Sec. Lt. H. McKenna, Gen. List; Sec. Lt. J. P. Angell, Gen. List, Feb. 1st; Lt. W. W. Stenning, Spec. Res., from the 3rd Cl., Feb. 7th. 3rd Cl.—Sec. Lt. (on prob.) E. C. Fowler, Spec. Res., Dec. 1st, 1916.

Experimental Officers, 2nd Cl.—(Graded as Equipt. Officers, 2nd Cl.)—From 3rd Cl.—Sec. Lt. H. J. Poole, Spec. Res., and to be temp. Lt. whilst so empld., Jan. 25th; Sec. Lt. (temp. Lt.) J. R. H. Whiston, Notts and Derby R., T.F.; Sec. Lt. E. W. Bowen, Spec. Res., and to be temp. Lt. whilst so empld., Feb. 1st.

Infantry.—Dorset R.—Lt. to be Capt. :—L. A. Strange, M.C., secd. for service with R.F.C.

Memoranda.—To be temp. Lts. whilst serving with R.F.C. :—Sec. Lt. (on prob.) J. G. Aronson, R. Lanc. R., Spec. Res. Temp. Sec. Lts. :—E. R. Wilkinson, J. Morris, F. M. Kitto, G. A. Hyde, M.C., W. Bruce, H. S. Wilcox, Jan. 1st.

Sub-Lt. W. H. Legge, from R.N.V.R., to be temp. Lt. on Gen. List for duty with R.F.C., Jan. 31st.

J. F. Dick to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Feb. 16th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on prob.) G. O. Lightbourn resigns his commission, Feb. 23rd.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. C. Porri is secd. for duty with the R.F.C., Feb. 23rd.

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From the "London Gazette," Feb. 23rd, 1917.

War Office, Feb. 23rd.

REGULAR FORCES. — Establishments. — R.F.C.—Flight Comdrs.—From Flying Officers, and to be temp. Capts. whilst so empld. :—Sec. Lt. (temp. Lt.) A. Jennings, R.A., Jan. 29th. Sec. Lt. (on prob.) (temp. Lt.) N. Brearley, M.C., L'pool R., Spec. Res.; temp. Sec. Lt. J. S. Barnes, Gen. List; Lt. (temp. Capt.) G. L. Hunting, North'd Fus., T.F., from a Flying Officer; from Flying Officers, and to be temp. Capts. whilst so empld. :—Lt. W. T. F. Holland, Lrs.; Lt. W. C. Mackey, Sco. Rif.; Lt. H. Hewett, R. Berks R.; Lt. A. C. Maund, Canadian Local Forces; Lt. C. H. Jenkins, R. Suss. R., Spec. Res.; temp. Sec. Lt. (temp. Lt.) S. E. Parker, Gen. List; temp. Lt. O Hughes, Gen. List; Sec. Lt. (temp. Lt.) S. L. Pettit, R. Fus., Spec. Res.; Sec. Lt. F. Egerton, Lrs.; Sec. Lt. T. S. Sharpe, Glouc. R., Spec. Res.; Sec. Lt. J. H. Kelly, Spec. Res.; Sec. Lt. A. C. Hatfield, Spec. Res.; Sec. Lt. R. D. Clinch, Spec. Res.; Sec. Lt. L. C. Angstrom, Spec. Res., Feb. 1st. Temp. Capt. C. N. Lowe, Gen. List, from a Flying Officer, Feb. 11th.

Depot Comdr.—Capt. (temp. Maj.) S. A. Hebden, Spec. Res., from a Comdt., School of Instr., and to be temp. Lt.-Col. whilst so empld., Jan. 18th.

Comdt.—(Graded as a Park Comdr.)—Temp. Capt. I. U. D. Truman, Gen. List, from a Chief Instr., and to be temp. Maj. whilst so empld., vice Capt. (temp. Lt.-Col.) S. A. Hebden, Spec. Res., Feb. 1st.

Equipment Officers, 2nd Cl.—From Flying Officers, and to be temp. Lts. whilst so empld.—Sec. Lt. F. G. Hogarth, Spec. Res., Jan. 3rd. Sec. Lt. J. V. Nash, Spec. Res., Feb. 1st. 3rd Cl.—Sec. Lt. F. W. Elstub, Spec. Res., Dec. 2nd, 1916. Sec. Lt. (on prob.) D. E. Barnett, Spec. Res., Dec. 22nd, 1916. Sec. Lt. F. Cain, Spec. Res., Jan. 28th. Sec. Lt. (on prob.) H. G. Day, Spec. Res., Jan. 31st. Sec. Lt. (on prob.) M. M. Merriman, Spec. Res., Feb. 1st.

School of Aerial Gunnery.—Comdt.—(Graded as a Sqdn. Comr.)—Capt. R. Bell-Irving, Canadian Inf., from a Wing Instr. in Gunnery, and to be temp. Maj. whilst so empld., Feb. 6th.

Scottish School of Fitters.—Chief Instr.—(Graded as an Equipment Officer, 2nd Cl.)—Sec. Lt. H. H. Steinberg, Spec. Res., from an Equipment Officer, 3rd Cl., and to be temp. Lt., whilst empld., vice temp. Capt. I. U. D. Truman, Gen. List, Feb. 1st.

Infantry.—General List, R.F.C.—Cdts. to be temp. Sec. Lts. (on prob.).—P. A. de Fontenay, R. Tyack, Feb. 1st. C. H. Halse, A. E. Marks, N. V. Schooley, W. A. Stillwell, B. C. Gay, G. A. Newenham, H. W. Elliott, W. A. Simmons, F. A. Herron, J. M. Baber, N. H. Albury, C. Pern, R. Harris, J. N. Stennett, V. H. Appleyard, M. S. West, L. P. Roberts, A. Champion, L. V. Labrow, J. K. Arnold, Feb. 6th.

Memoranda.—Sgt. A. S. Talbot, from Australian Imperial Force, to be temp. Sec. Lt., for duty with R.F.C., Aug. 16th, 1916.

To be temp. Sec. Lts. (on prob.) for duty with the R.F.C. :—L.-Cpl. R. N. Swann, from Australian Imperial Force, Aug. 8th, 1916. W. H. Dowling, R. S. Eachus, Jan. 30th. L. R. Peirce, Feb. 9th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—The following Sec. Lts. (on prob.) are confirmed in their rank :—L. A. Tapper, V. M. Bowling, E. N. L. White, W. N. Spragg.

To be Sec. Lts. (on prob.) :—S. H. Roberts, Feb. 6th. G. Ashworth, H. J. Ashwell, E. E. Blackall, S. L. Collins, W. G. Cullen, J. O. Clover, H. J. Clark, W. E. Dewbery, W. P. Farrow, W. H. Griffith, W. Gardner, B. A. Hill, B. S. Higgs, R. Hely, B. B. Johnson, G. G. Kitsen, A. C. F. Lewns, H. S. Lewin, H. J. Lewis, W. E. Lowe, A. McCulloch, D. H. Moore, A. H. Prior, A. H. Page, P. H. Paul, F. J. R. Perfitt, T. Sherman, R. Stanley-Smith, R. J. Saunders, H. J. Skingle, W. Towell, J. I. Thompson, D. Warnford-Davis, C. G. Walton, G. G. Wood, Feb. 9th. S. E. Brett, F. J. H. Palmer, D'A. L. A. Searle, Feb. 12th.

TERRITORIAL FORCE.—R.G.A.—Sec. Lt. (temp. Lt.) J. R. Bedwell is secd. for duty with R.F.C., Jan. 18th.

Infantry.—E. Kent. R.—Sec. Lt. L. A. T. Strange is seconded for duty with the R.F.C., Feb. 1st.

Welsh R.—Sec. Lt G. T. Brown (since deceased) is seconded for duty with R.F.C., Feb. 7th.

L. N. Lancs. R.—Sec. Lt. (temp. Lt.) M. T. Wright is seconded for duty with R.F.C., Feb. 7th.

Highland L.I.—Lt. (temp. Capt.) C. B. J. Lancaster is seconded for duty with R.F.C., Jan. 25th.

Arg. and Suth'd. Highrs.—Sec. Lt. D. Gordon is seconded for duty with the R.F.C., Jan. 29th. Sec. Lt. C. R. Dougall is seconded for duty with the R.F.C., Feb. 7th.

Hertford R.—Sec. Lts. are seconded for duty with the R.F.C. : E. G. N. Grible, F. G. Lake, Jan. 18th.

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From the "London Gazette" Supplement, Feb. 24th, 1917.

War Office, Feb. 24th.

REGULAR FORCES.—Staff.—Temporary Appointments at War Office.—Dep. Dir. (graded for pay as an Asst. Dir.).—Temp. Hon. Lt.-Col. J. D. Cormack, C.M.G., Gen. List, from an Asst. Dir., and to be temp. Hon. Col. whilst so employed, Dec. 14th, 1916.

Asst. Dir.—Capt. F. C. Jenkins, R.F.C., Spec. Res., from a Dep. Asst. Dir., and to be temp. Lt.-Col. whilst so employed, vice temp. Hon. Col. J. D. Cormack, C.M.G., Dec. 14th, 1916.

Dept. Asst. Dirs.—From Staff Capts.—Dec. 14th, 1916 : Capt. C. W. C. Wheatley, R.F.C., Spec. Res.; Temp. Capt. C. M. Smith, M.C., Gen. List; Temp. Capt. R. H. Brand, Gen. List.

Major O. A. Walker, A. Ord. Dept., an Ord. Officer, 3rd Cl., from Dec. 14th, 1916, to Feb. 11th, 1917.

Sec. Lt. (temp. Capt.) C. H. Whittington, R.F.C., Spec. Res., from an Equipment Officer, 1st Cl., R.F.C., and to retain his temp. rank whilst so employed, Dec. 14th, 1916.

Temp. Major T. E. St. C. Daniell, M.C., Gen. List, from a Park Comdr., R.F.C., vice Major O. A. Walker, A. Ord. Dept., Feb. 12th, 1917.

Dep. Asst. Dirs. (graded for pay as Staff Capts.).—Dec. 14th, 1916 : Major J. G. Weir, R.F.A., T.F., from a Squadron Comdr., R.F.C.; Major I. B. Davson, Yeo., T.F., from a Staff Capt.; Temp. Capt. R. H. Austin-Sparks, Gen. List, from an Equipment Officer, 1st. Cl., R.F.C. Temp. Maj A. E. J. Reiss, attd. Ches. R., from a Staff Capt., and to be transfd. to Gen. List, Jan. 18th, 1917. Temp. Capt. K. G. S. Hatfield, Gen. List, from a Staff Capt., Feb. 17th, 1917.

Staff Capts.—Dec. 14th, 1916 : Temp. Capt. T. B. Morley, Gen List, from an Equipment Officer, 1st Cl., R.F.C.; Sec. Lt. M. O. Darby, R.F.C., Spec. Res., from a Staff Lt., and to be temp. Capt. whilst so employed; Capt. G. W. Williamson, M.C., Manch. R., Spec. Res., from a Staff Lt., vice Capt. C. W. C. Wheatley, R.F.C., Spec. Res; Sec. Lt. T. G. Leith, R.F.C., Spec. Res., from a Staff Lt., and to be temp. Capt. whilst so employed, vice temp Capt. R. H. Brand, Gen. List. Temp. Capt. T. P. Searight, A.S.C., and to be transfd. to Gen. List, vice temp. Capt. L. Sadler, A.S.C., Jan. 1st, 1917.

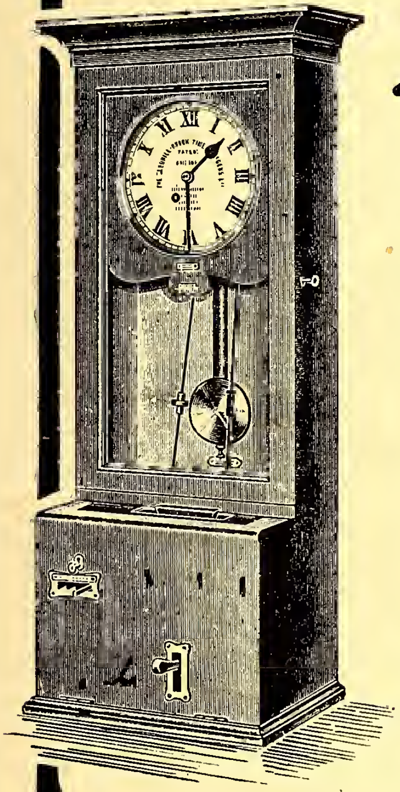
Staff Lts.—Dec. 14th, 1916 : Temp. Capt. H. J. Page, Lond. R., T.F.; Sec. Lt. W. Park, R.F.C., Spec. Res., from an Equipment Officer, 3rd Cl., R.F.C.; Sec. Lt. H. Lloyd, R.F.C., Spec. Res., from an Equipment Officer, 3rd Cl., R.F.C.; Temp. Sec. Lt. T. G. Baxenden, attd. R. Fus., and to be transfd. to Gen. List, vice Capt. G. W. Williamson, M.C., Manch. R., Spec. Res.; Temp. Capt. E. P. Leigh-Bennett, Lond. R., T.F., vice Sec. Lt. (temp. Capt.) T. G. Leith, R.F.C., Spec. Res.; Lt. A. P. Thurston, R.F.C., Spec. Res., vice Sec. Lt. R. W. B. Billinghurst, R.F.C., Spec. Res.; Sec. Lt. H. B. Neame, R.F.C., Spec. Res., from an Equipment Officer, 3rd Cl., vice temp. Capt. R. A. Coote, Gen. List.

Establishments.—R.F.C.—Sqdn. Comdr.—Temp. Capt. P. G. Ross-Hume, Gen. List, from a Flt. Comdr., and to be temp. Major whilst so employed, Feb. 9th.

Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed :—Temp. Lt. R. J. Sanceau, Gen. List, Feb. 8th. Temp. Sec. Lt. C. R. Cox, Gen. List, Feb. 9th. Sec. Lt. J. F. Gordon, Gord. Highrs, Feb. 14th. Sec. Lt. J. L. Leith, Hamps R., T.F., Feb. 17th.

Flying Officers.—Temp. Sec. Lt. A. S. Talbot, Gen. List, Dec. 25th, 1916. Lt. A. Forson, R. Sco. Fus., Spec. Res., and to be secd.; Sec. Lt. C. R. Dougall, Arg. and Suth'd Highrs., T.F., Feb. 7th. Temp. Sec. Lt. H. Turner, Training Res. Bn., and to be transfd. to Gen. List, Feb. 8th. Temp. Sec. Lt. B.

(Continued on page 580.)



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The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

V.—THE SOPWITH AVIATION COMPANY.

These are the days when no one needs to cite in his own defence Pitt's famous apologia for the "atrocious crime of being a young man." The country has called upon the strength of youth, and has been answered in full measure. But all who know him will agree with me that Mr. T. O. M. Sopwith, whose aeroplanes are known in both hemispheres, has one characteristic which is even more remarkable than the extraordinary success of his machines. In a word, he anticipated the day of the young man.

It is no uncommon thing, I believe, in America, for men who are barely out of the adolescent stage to be in command of flourishing concerns, but in England the sight is rare, and there can be few British firms which have so young a head, and yet so keen and able, as that of the Sopwith Aviation Co. And though one leaves this loophole of possibility by using the word "few," it is more than likely that if any such exist it is a case of the son having succeeded to the business of his father. Mr. Sopwith, nevertheless, had already been a partner in a motoring concern when he struck out a new line for himself, and not only established a business while young himself, but chose the industry which is the youngest in the world. If men marvel at the achievements of our pilots at the Front, they may well admire also the foresight of Mr. Sopwith, himself a pilot as early as 1910, in founding the firm which bears his name, and the energy and skill with which he has controlled its destinies. But his success as a flier was no less remarkable. He mounted an aeroplane for the first time one evening, and took his pilot's certificate on the day following!

Mr. T. O. M. Sopwith.

This was at Brooklands, on a Howard Wright biplane, which was fitted with a 60-h.p. E.N.V. engine. In less than a week after this Mr. Sopwith had beaten the previous best for the Michelin Cup. Not very much later he won the de Forrest Cup on a Howard Wright biplane by a flight from Eastchurch to Beaumont in Belgium, then the longest cross-country, not to mention cross-Channel, flight ever made—truly an auspicious opening of a pilot's career.

In the spring of 1911 he went to America, taking with him his Howard Wright biplane and also a 70-h.p. Blériot monoplane, one of the first made. Competing successively at aviation meetings at Chicago, Boston, and New York, he scored premier honours at each. While in the United States he bought two Wright machines and also a Burgess-Wright; the last-named he brought back to England, and fitted it with a Gnome engine. It was immediately on his return from America, in fact, that he took up constructional work and established himself at Brooklands.

The following year was memorable in more ways than one. It was in June, 1912, that Mr. Sopwith won the Aerial Derby on the Blériot, covering a distance of 81 miles. But he had also the satisfaction of seeing the first aeroplane which was turned out at his own works gain the Michelin prize for all-British aeroplanes, in the hands of Mr. Hawker, with a performance of 8 hours 23 minutes. The machine was very much on Wright lines, with an A.B.C. engine.

The next round on the ladder of progress was the production of a three-seater tractor, with a 70-h.p. Gnome engine, which the Admiralty acquired for instructional purposes at Eastchurch.

But though one may single out these items as landmarks in the history of successes, it is not to be supposed that this pioneer work was all "cakes and ale." While nothing will induce Mr. Sopwith to talk about the struggles of these early days, he does at least confess that he passed through vicissitudes enough and to spare, and that he fears to reflect nowadays upon the time and money he threw away in experiments.

Others there are, too, who can say the same; but the glory of their heritage none can assail, for it is the outcomings of their efforts that are maintaining to-day Britain's ascendency o'er sea and land.

Before the close of 1912 Mr. Sopwith decided to relinquish active flying and devote himself entirely to the control of the firm. In January, 1913, this blossomed into the Sopwith Aviation Co., and the address was changed to Kingston-on-Thames, where four years of consistent progress have been enjoyed. A skating rink was chosen as the site of his first factory.

There it was that the first Sopwith 3-seater 80-h.p. Gnome biplane was built; it will be remembered as a leading exhibit at the Olympia Show of that year. The design proved successful, and a series of this type of machine was acquired by the Army.

Then came the *clou* of the Sopwith career—the "Bat-boat," the original flying boat which signalised the genesis of the British seaplane. It was fitted with a 100-h.p. Green engine, and won the Mortimer Singer prize for the first British machine to rise from and alight upon both land and water. Other examples were afterwards built on the same lines, but of varying size and power. The last one was fitted with a 200-h.p. Canton Unné engine, and was shipped—*horribile dictu*—to Germany just before the war!

[Which is perhaps why the Admiralty has had no more of this, one of the very finest types of seaplanes ever designed.—Ed.]

One must not omit to mention, by the way, another noteworthy performance of this period—namely, that of Mr. H. G. Hawker in the "Daily Mail" "Round Britain" competition, the first contest for seaplanes in Britain. The Sopwith, however, fitted with a 100-h.p. Green motor, was the only machine to start. Accompanied by Mr. H. Kauper, a fellow Australian, Mr. Hawker started from Southampton, followed the southern coast, and then the east Coast all the way to Inverness, descended the Caledonian Canal to Oban, and crossed the Irish Sea to Dublin, where a bad landing ended a magnificent flight of something like a thousand miles.

But if the "Bat-boat" marked an epoch, what shall be said of the Sopwith "Tabloid," produced in the same year? (Who, too, after this, can say that "13" is an unlucky number?)

The Tabloid startled the whole aviation world by proving that a biplane could be built with a broader speed range than a monoplane as well as being faster. As a matter of fact, the original two-seater Tabloid, with an 80-h.p. Gnome, passed the War Office tests with a slow speed of 36.9 m.p.h., and a fast speed of 92 m.p.h., and then climbed 1,200 ft. per minute.

These were indeed figures to conjure with, and definitely established the position of the type, which has since been officially classed as the "speed scout," but of which the Tabloid was the undoubted prototype. It was afterwards altered to a single-seater, carrying more fuel.

In April, 1914, the Sopwith firm scored a remarkable success at Monaco, Mr. Pixton winning, on a Tabloid fitted with floats, the Schneider Cup contest, which was a sort of Gordon-Bennett race for seaplanes. This was the only occasion on which an international aviation event has been won by an English machine.

The Army acquired several Tabloids at the beginning of the war; as a matter of fact, they were among the first British aeroplanes to be seen at the Front.

An even more remarkable distinction, moreover, attaches to this type of machine, for it holds the proud distinction of having been the first aeroplane to destroy a Zeppelin! On the very day that Antwerp was evacuated Flight Lieut. R. L. G. Marix raided the Zeppelin hangars at Düsseldorf, in conjunction with Squadron Commander Spenser D. A. Grey, who went to Cologne, and at Düsseldorf he destroyed a new "Zepp," of the latest type, with "silent" motors, and also bombed a machinery hall.

The human element, of course, counts for much in adventures of this kind, but is the same in each and all, successful or unsuccessful, namely, the essence of super-sublimated daring; but that the machine itself plays no small part as a determining factor, according to its speed and suitability, is incontestable.

Two other facts of incidental interest have yet to be recorded. In the first place, a series of seaplanes was built for the Greek Navy, but had not been delivered at the time the war broke out, and the whole lot were then commandeered for our own Admiralty. Secondly, a German branch of the Sopwith Aviation Co. was in actual course of formation in March, 1914, but naturally the negotiations were abruptly closed.

Of what has been done at the ever-growing works at Kingston since the war began it is, of course, impolitic to speak in any but general terms, but it may at least be said that the progress of the firm in design and output has been no less gratifying than it has been rapid. The machines that have been built during the war are just as revolutionary as the original Tabloid.

The Kingston works are exclusively engaged on Admiralty work, but the War Office also secures numerous examples of machines of the same type, as they are built by many firms of sub-contractors in various parts of the country.

And there is one feather in the cap of the Sopwith Aviation Co. which is now no official secret, but may be recalled here as an essential item in a record of the firm's achievements. Everyone will remember two comparatively recent flights which were among the most dramatic in the war. The first was the raid on Essen by Captain de Beauchamp and Lieut. Daucourt, two French officers on English machines, and those machines Sopwiths.

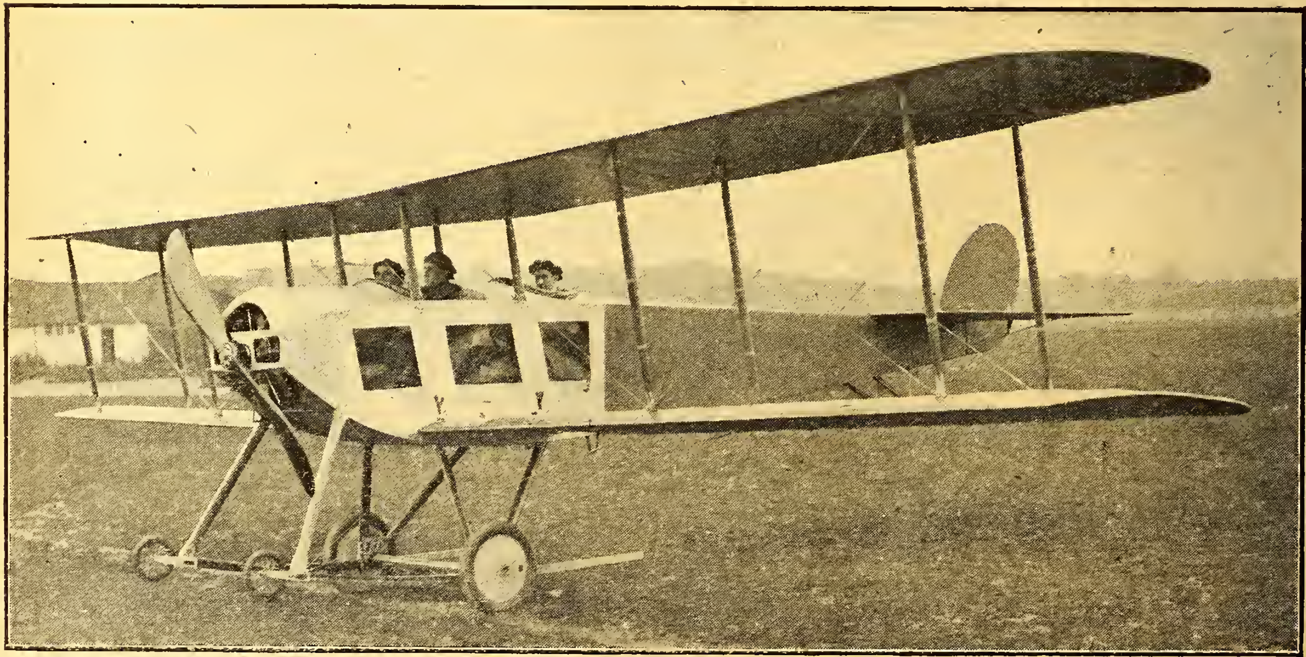
That of Captain de Beauchamp had already seen a great deal of service, and was also constantly being flown before he set forth on the second amazing raid on Munich, whence he proceeded southwards over the high Alps of Tyrol, and penetrated as far into Italy as the outskirts of Venice.

While this review of the history of the Sopwith Aviation Co.'s rise and progress cannot be carried further, enough has been said to show that Mr. T. O. M. Sopwith may well feel proud of what he has accomplished in so short a time.

He has been fortunate in his coadjutors, as they in him, and a very happy family is formed by the quartette which comprises Mr. Sopwith, Mr. R. O. Cary, general manager ever since the starting of the Kingston works, Mr. F. Sigrist, works manager from the Brooklands days, and Mr. H. G. Hawker, the chief tester, who learned to fly at Brooklands in the early days of the firm.

When it is borne in mind that these four are all keen and able aircraftsmen, the success of the firm is the less to be wondered at. The accompanying illustration shows the serious and practical interest which the management take in the development of their own designs, for here we see Mr. Sopwith himself piloting the first machine produced at the Kingston works, with Mr. Cary and Mr. Sigrist as passengers.

The chief obstacle, as elsewhere, of course, of the earlier efforts at construction was that there were no men to be had who knew the business. All work was empirical, and the principals had to employ a man and then teach him something they did not know themselves! A certain amount of groping about in the dark was therefore inevitable, but that period is now at an end, and there is a solid basis of practical and successful experience upon which to work.



A GOOD COMBINATION.—Mr. Sopwith as pilot, Mr. R. O. Cary and Mr. F. Sigrist as passengers, in the first Sopwith Biplane (80-h.p. Gnome engine) turned out at the Kingston Works.

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Telegraphic Address—
VICKERFYTA, KNIGHTS, LONDON.

It was only natural when gleaning the main facts for this article from Mr. Sopwith that I should invite an expression of his opinions as to the future of warfare in the air, and I was pleased to find that he was among those who attach the highest possible importance to the work of the new arm.

War without aircraft, as he pointed out, has been shown to be impossible; but not only that, he had not the slightest doubt but that aircraft would be the determining factor in any future war, and even in the present struggle if it did not end soon.

Raids and bombing, he believed, were going to be a much more important feature of the war than heretofore, and he saw no reason for regarding the destruction of Essen itself as impracticable. Mr. Sopwith also drew attention to the value of aeroplanes to a small country without a seaboard, as, with a big fleet of aircraft, it could go far to overcome its geographical disadvantages.

Confident as he is, however, as to the future of the aeroplane in warfare, Mr. Sopwith does not speak of flying possibilities in general from the purview of the unpractical but hypersanguine enthusiast.

Asked as to the possibilities of a regular cross-Channel service, he merely replied that for the present he was too busy with war work to have given any consideration to the subject, and had no views to offer thereon.

He did express an opinion, however, under pressure, as to the feasibility of a trans-Atlantic flight. This, he believed, would be accomplished, with luck as to conditions, by some venturesome person, but no useful purpose would be served thereby, and, once achieved, the performance would probably be forgotten for years.

[One can only suggest that there seems to be subject-matter for sundry small bets here or hereabouts.—Ed.]

The Third Meeting of the Aeronautical Society.

On Feb. 21st a most interesting lecture was delivered to the Aeronautical Society of Great Britain by Captain G. S. Walpole, D.Sc., F.I.C., of the Aeronautical Inspection Department, R.F.C., entitled "The Less Satisfactory Materials of Aircraft Construction." Mr. Henry Fowler, Superintendent Royal Aircraft Factory, occupied the chair, and thus made his first, and a very welcome, public appearance among the Aircraft Industry and aeronautical investigators.

Captain Walpole stated that materials other than metal were less satisfactory because they were not so permanent against age and varying conditions of temperature and humidity, and further that the best results could not be obtained with the same precision of forecast.

Rubber in Aircraft.

The first material considered was rubber as a shock-absorbing agent. A series of most interesting slides were shown demonstrating tests on Palmer aeroplane tyres up to loads of 5 tons per wheel. On the particular wheel in question the spokes collapsed without the tyre being affected. He pointed out that there was no object in making the tyre lighter, as it had to stand wear and tear on the ground besides direct strain. One particularly interesting picture showed a quite wonderful machine which tests wheels and tyres in apparently all directions at once. This photograph also showed a tyre evolved by the Palmer Company specifically for use on soft ground.

Referring to shock-absorbers in under-carriages, Dr. Walpole showed how the rubber rings commonly used are stressed in an entirely improper way, and remarked that unfortunately some of them do stand up to the work, and so prolong the use of this arrangement. He described various endeavours to find information as to the actual tensions involved, and pointed out that an ideal shock-absorber should be like a "pudding" which gives to a load and slowly resumes its shape. Steel springs are unsuitable because when loaded they hit back at once. At this point he showed a "Hysteresis Diagram" which is of great interest.

Dr. Walpole admitted that he is not an expert in rubber, but suggested that aircraft designers do not specify what work is required from rubber shock-absorbers, so rubber manufacturers work in the dark. If asked to supply rings for such purposes as those for which they are frequently used, a conscientious manufacturer would refuse to supply them.

Dr. Walpole then discussed the use of rubber piping for conducting liquids about aircraft, and exhibited various specimens of piping which had failed to fulfil its purpose, referring to them very appositely as a kind of "Chamber of Horrors."

On the subject of rubber fabric for balloons, Dr. Walpole told an entertaining story of a "nurse-balloon" at the front which broke away and drifted across country. Finally the rigging and other tackle was recovered some miles away, but the fabric of the balloon had entirely disappeared—a fact for which the weather did not seem to account. It was noticed, however, later, that the soldiery in the vicinity had acquired a number of nice green water-proof coats.

Glue and its Uses.

On the subject of glue, a number of interesting slides were shown of glued joints in section, and Dr. Walpole emphasised the fact that it is necessary to ensure that whatever else breaks in an air-screw, the glued joint shall never go. Describing these experiments, he said that after a number of experiments apparently contradicting one another, one almost falls into despondency, but that if one continues long enough one is finally able to say that joints made in certain ways are so strong that under any conditions the wood will go before the joint.

He discussed in detail methods of delaying the setting of glue so as to allow permeation of the wood fibres, and also the effects of temperature on gluing work. It is, however, inadvisable to give particulars on these points, as the information so industriously gathered by the lecturer might well prove of interest to the enemy.

Dope and Varnish.

Turning to the subject of varnish for fabric, Dr. Walpole remarked on his dislike of the word "dope," and hoped that synonyms may be discovered for it—a sentiment with which one cordially agrees. He pointed out how too much tautness in the fabric is liable to buckle wing structures, and how lack of tautness means sogginess in the wing and loss of lift. He emphasised the need for uniform tension of fabric under all conditions, even under a generous dew of castor oil.

Dr. Walpole referred to dope-manufacturing as a specialised branch of the plastic industry analogous to the production of cinema films, knife handles, and combs from acetyl cotton or nitro cotton.

He referred to the use of various softening agents, and remarked that there were lots of other things in dope, though it might not be kind to say why they were put there. Again, one refrains from publishing details of this section of the lecture, for although our first acetyl-cellulose dopes came from Germany the Germans are probably suffering from much the same troubles as we are, and it would be unwise to indicate any way out of those troubles.

An Object-Lesson.

An inspection of the Fokker monoplane now on exhibition at Lady Drogheda's show at the Grosvenor Galleries affords an excellent example of what happens to German dopes in time, and apparently it bears out Dr. Walpole's statement that it is the ultimate fate of all dopes to crack.

He pointed out that the tautness of fabric increases up to four or five coats of dope, and thereafter one merely adds weight. He stated, moreover, that cellulose-acetate is not rigidly defined chemically, and that samples containing the same constituents differ widely in their characteristics. With due apologies, he expressed the opinion that tightness was not consequent on the alcohol in the dope.

He stated that the consummated wisdom of experiments shows that the less the amount of fabric in proportion to the amount of dope the tauter it becomes. Chiffon, for example, when doped, draws up extraordinarily tight; dope on cotton is unsatisfactory, and the film breaks up.

The Effects of Weaving.

Referring to the weaving of fabric, he stated that the shuttle makes a hundred movements for every inch of fabric produced, and when one sees orders going through for millions of yards of fabric, "one realises that that shuttle has to get a move on." The shuttle has to be lubricated and the lubricant used spoils the adhesion of the dope. Tetrachlorethane clears the lubricant, and dope made with it does not come off.

On the subject of tautness of fabric, Dr. Walpole exhibited a neat and simple instrument for measuring the degree of tautness.

A Neat Story.

Referring to the days before such instruments were evolved, he told of an R.F.C. officer, or some other official, who was studying the effects of various dopes on aeroplane wings under all sorts of conditions. His duty took him all over the country, and he was continually tapping fabric with his fingers till he acquired not only great sensitiveness as to tautness, but also the tapping habit.

After some months he was invited to dine with his No. 1 Aunt, who after dinner took him to her picture gallery to show him her wonderful "Old Masters." Habit was too strong for the dope investigator, who, instead of admiring the picture, stepped up to a frame and solemnly tapped the canvas and tested its tautness.

One may perhaps hazard the opinion that it was just as well for his prospects that he refrained from testing with his nails the adhesion or permeation of the paint.

Light Effects.

Dr. Walpole then proceeded to the subject of the uses of varnish to protect dope against wet and weather, and described the peculiar phenomenon of the slacking off of doped fabric directly sunlight leaves it, and its tightening up again when absolute darkness follows. This alternate slacking and tightening, he said, accounts for the cracking of the film of dope, and shows the

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need for a light-proof as well as a water-proof protective varnish. He ascribed the credit for producing such a combination varnish to Dr. Ramsbottom, of the Royal Aircraft Factory.

Some interesting slides were shown illustrating the growth of mould on different doped fabrics. The growth on dope in which French benzyl alcohol was used was remarkable, especially in view of the fact that no mould grew on dope made with British benzyl alcohol.

Protecting Wood.

Turning then to the protective coating of other parts than fabric, Dr. Walpole recalled that the ancient hansom cab was given 24 coats of paint to protect it, and that air-screws so treated would occupy 54 man-hours in finishing alone. In these days, French polishing, which was cheap and nasty, only takes seven hours.

Dr. Walpole then referred to what he described as a "Varnish Tourney," which took place in a meadow near historic Runnymede. Five aged men, still possessing that almost extinct quality pride of craftsmanship, entered the lists and operated on various air-screws according to their different methods.

The results were left for three months in the open. They were then soaked in petrol, then in boiling water, and then in hot castor oil. Mr. Lang, who occupied the position of the Queen of Beauty in the aforesaid Tourney, adopted the winning method for his own air-screws, and added thereto a period of gentle massage with pumice stone.

Magnetos.

Finally, Dr. Walpole disclosed some interesting facts about fibre insulators in magnetos.

He terminated a highly interesting and considerably humorous lecture by pointing out that chemistry comes in where experiment fails to discover causes.

The Discussion.

Mr. C. H. Gray, of the Palmer Tyre Company, who with Mr. Spooner has been responsible for the immense success of that firm's products on cycles, cars, and aircraft, expressed his appreciation of Dr. Walpole's lecture and of his recognition of the fact that good results cannot be achieved without intimate exchange of ideas between aeroplane designers and manufacturers of material.

As a rubber manufacturer, he thought there was ignorance on both sides, and that the rubber manufacturer could produce what was wanted if he knew for what purpose it was wanted. He quoted a wise saying of his father's, who told him that if he wanted to study a machine he should sit down and watch it work, and then, when he thought he knew all about it, sit down and study it again; and when he did really know the machine—his father said—if he thought it would be any good for that work in ten years' time, he was a fool.

Referring to the uses of dope, Mr. Gray drew attention to the wide difference between hemp fibre, which is straight, and cotton fibre, which is of corkscrew formation, and stated that the latter stood vibration least. He expressed his appreciation of the benefit to the industry of Dr. Walpole's lecture.

Mr. Walter Read said that it was the duty of those who listened to such a lecture to state what they knew. He had used acetyl-cellulose experimentally on a balloon for the late The Hon. Charles Rolls. An interesting varnish called Velvril is made of collodion cotton and nitrated castor oil. This film never cracks, and combines with cellulose acetate. Cotton is a tube, and so absorbs more liquid that the square cells of other materials. In proofing balloon fabrics bubbles could be entirely avoided by working the spreading machine at the proper speed. Unless varnish is somewhat viscous, fabric cracks because there is no room for it to bend.

Experience for Real Knowledge.

Knowledge as to the effects of light on various varnishes might be obtained from the records of the Paint and Varnish Society of the U.S.A. If Dr. Walpole would read a paper to the British Paint and Varnish Society he might get valuable information from people with years of experience of these substances.

He suggested permeating the threads of fabric with diluted dope before weaving, and further suggested that casein cement is better than glue.

Lt.-Col. Clive Waterlow, R.E. (Wing-Captain, R.N.A.S,), described the shock-absorbing effects of combined floats and bumping bags in the form of "puddings," on the cars of airships. He mentioned that before the war France and Germany used yellow balloon fabric as protection for the rubber against the light. He spoke of weathering tests of fabric in Somaliland, and the result of good dyes under these conditions. He also recalled that aluminium dope on airships was tried in Italy before the war.

He referred to the German trick of keeping the fabric on the control planes of the Parseval airship taut by fitting airscoops, so that the planes were distended by air pressure.

Mr. Handley Page said that the micro-photographs reminded him of a temperance lecture on beer, in that they showed us what we ought not to do. He inquired of Dr. Walpole respecting the artificial seasoning of wood as practised in America by impregnating the fibres with molasses. [An idea which suggests saccharine consolation from splinters for young aviators who have crashed their machines.] He also related some interesting experiences regarding the use of braided cord over rubber in shock-absorbers.

Dr. Aston asked as to the methods by which the dope was applied in various specimens.

Mr. White-Smith, of the Bristol Co., and Chairman of Council of the S.B.A.C., asked as to the possibility for putting on dope in one operation, instead of using so much time and material through evaporation and multiplied coats.

Lt.-Col. Bagnall Wilde, A.I.D., asked for information regarding the weight per square foot of fabric, dope, and protective coating.

Dr. Goldsmith mentioned that rubber fabric was tried on aeroplanes at first, then linseed oil dried off, then collodion varnish, thereafter Voisin used flour paste, and afterwards gelatine and glue. Delagrange, using the latter dope, flew in the rain, which dissolved the dope, and his wings broke up. [This explanation of Delagrange's death is open to argument if not to refutation.] Farman tried powdered resin.

Dr. Hackney compared the behaviour of cotton and linen under dope.

Dr. Dreyfus spoke of castor oil as a solvent.

A Sub-Lieut., R.N.A.S., whose name escaped one's hearing, inquired anxiously for the name of a firm which makes petrol-proof rubber pipe.

Dr. Walpole replied informatively to the various questions, though it is not wise here to give the information which he gave to the meeting.

Mr. Fowler, who certainly makes a model chairman, in thanking Dr. Walpole for his lecture, said that he had dealt lucidly with many of the little things which worry the manufacturer, a sentiment with which all present cordially agreed.

In the absence of Lt.-Col. Mervyn O'Gorman, C.B., Major-Gen. Ruck, Chairman of the Aeronautical Society, proposed a vote of thanks to Mr. Fowler for presiding, thus assuming the function fulfilled so gracefully at the Society's previous meetings by the first-named officer.

A Note by the Reporter.

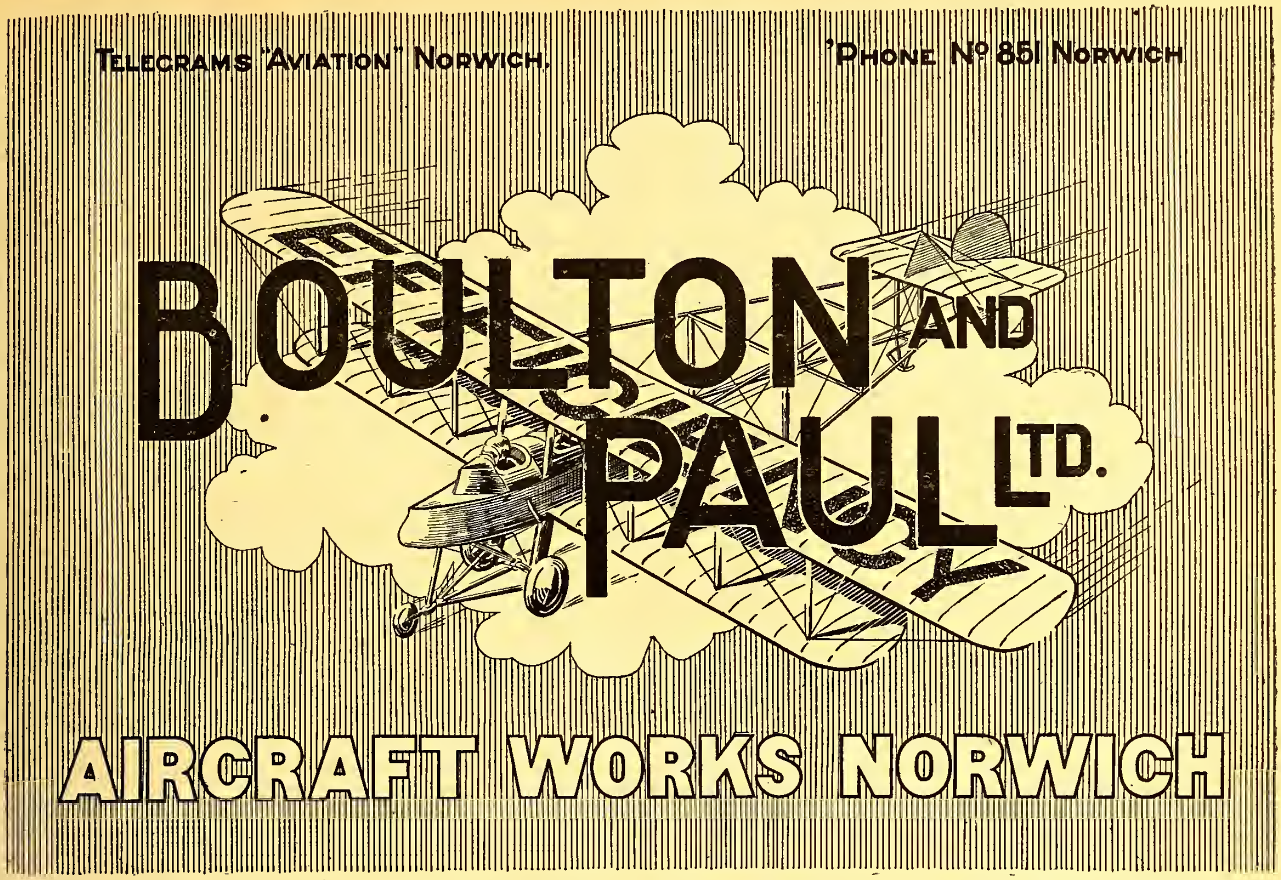
As one who is incapable of speaking in public, perhaps I may be permitted to contribute to the discussion in print. Dr. Walpole might with advantage investigate a species of flexible petrol pipe put on the market by the Bowden Patents Syndicate a matter of 13 years ago. I used this piping for some thousands of miles on a motor bicycle under extraordinarily strenuous conditions, and never had the slightest trouble with it. It never came into general use because it was dearer than copper pipe, and had to be properly fitted, though the fitting was simplicity itself when one knew how, and infinitely simpler than copper pipe fitting.

Knowledge of the peculiarities of petrol piping is advisable for flying officers. I well remember an incident between two officers of the R.F.C. during manœuvres of 1913. One of them started from the aerodrome and came back in a minute or so with his engine missing badly. Investigation by his Flight Commander (a Sapper officer, now Lieut.-Col.) disclosed the fact that the pilot, finding that the rubber composition petrol pipe was leaking badly, had bound the leak with a mass of ordinary insulating tape, which certainly stopped the free passage of the petrol, but resolved itself into a kind of sticky sponge in close proximity to the exhaust of the engine. The missing of the engine was chiefly due to the interior of the petrol pipe depositing itself as a species of jelly in the carburettor. The subsequent remarks by the C.O. were terse.

As regards the importance of fabric, it would be interesting to know its precise effects on the speed of a machine as between an absolutely board-hard fabric, subject to all the troubles of ordinary dope, and a fabric with a certain amount of give in it which could be relied upon to remain in that state indefinitely, under all conditions.

The minute care expended by Dr. Walpole on his experiments, as indicated by the subject-matter of the lecture, somehow recalls the story of the small boy who said to his father, "Daddy, did God make everything?" "Of course he did, dear," said the father. "Daddy, did God make little flies?" asked the child. "Of course he did," replied father again. "Fiddling work making flies!" was the comment of the young philosopher.

Nevertheless, one may rest assured that it is well worth while to do this fiddling, if highly fascinating, work, so long as the investigators' minds are not so absorbed in minutiæ as to lose sight of bigger issues. For example, one would like to suggest to the consideration of Dr. Walpole and his Department the possibilities of using an entirely different scheme of wing covering which might abolish altogether fabrics and dopes and the consequent study of these subjects. Also there is the possibility of constructing propellers entirely of other material than wood, with consequent abolition of many gluing troubles. Large engravings and the training of horses fill their places in the world equally with the scribing of the Lord's Prayer on a threepenny-bit and with the training of performing fleas.—C. G. G.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The Albatros Biplanes of To-Day and Yesterday.

"L'Aérophile" for January 1st-15th contains an elaborate article, illustrated by photographs and drawings, describing the Albatros aeroplane. The essence of this article is given hereafter, with due acknowledgment to the courtesy of the editor of that excellent paper, and his talented colleague, M. Jean Lagorgette.

The aeroplanes constructed by the Albatroswerke Gesellschaft at Johannisthal, Berlin, were not the least well-known (in France) of German aeroplanes before the war, Lieut. Steffen having landed at Boulogne, and Herr Hirth having flown across France in his journey from Gotha to Marseilles, via Frankfort and Dijon, on the occasion of the Rallye at Monaco in April, 1914, on machines of this type.

Created in 1910, this firm, after constructing Farmans and Antoinettes, was placed under the management of Herr Helmuth Hirth in 1912, who continued to fly and to take part in competitions. The firm possessed schools at Adlershof (with workshops), Breslau, Gotha, Graudenz, Hanover, Posen, and Schneidemühl.

An Austrian Albatros Company, at the time of the outbreak of the war, constructed biplanes identical with the 1914-15 type of machines, save that four divergent struts constituted the cabane, as in the case of certain D.F.Ws.

The Albatros firm held no less than ten records, the last five being on the military type biplane. In addition, there was, of course, the altitude performance of Lieut. Bier in Austria.

During the aviation week at Vienna on June 28th, 1914, Herr E. von Lössl and Herr H. Hirth both attained the altitude of 4,770 metres (about 16,600 ft.), the former with 3 passengers and the latter with 2).

On the same day Herr Landmann kept the air for 21 hours and 50 minutes on an Albatros biplane of 14.5 m. (about 45 ft.) span, commencing the flight with a useful load of 600 kgs. (1,350 lbs.), and on July 10th-11th Herr Böhm flew for 24 hours and 10 minutes, with a 75-h.p. Mercédès motor.

Setting aside the numerous pre-war types of Albatros, such as monoplanes and biplanes of the Taube type of 1912, there remain only the types at the outbreak of hostilities. They were all fuselage biplanes with air-screw and motor in front. All the machines had separate cock-pits for pilot and passenger. On the earlier types the pilot sat behind. Before 1914 all the Albatros machines were of the arrow type; since then, otherwise.

There are six principal types—in order of appearance, and in order of diminishing size:—

No. 1. Type 1914, 16.3 m. (about 53 ft.) span.

No. 2. Type 1913-14 (large wing surface), 14.5 m. (about 43 ft.) span, which, if it was not produced before No. 1, has at least survived it.

No. 3. Military type 1914-15, 12.9 m. to 13.1 m. (about 40 ft.) span.

No. 4 and 5. Reconnaissance biplanes, 11.3 m. (about 36 ft.) span, transformed about the beginning of 1916 to C.III, general utility type, of 11.75 m. (about 35 ft.) span.

No. 6. Production of 1916, the fighting single-seater D.1 of 8.6 m. (about 28 ft.) span.

At the declaration of war the first three types (16.3 m.; 14.5 m.; and 12.9 m.) were utilised. The two first were not long in disappearing from the Western Front at the commencement of 1915, and do not seem to exist any longer. The third type continued to be constructed with slight modifications, but during 1916 it was relegated to the Eastern front, where it appeared in various types. The fourth, the small reconnaissance biplane, appears only to have had an ephemeral existence, at the end of 1915 and the beginning of 1916. Numbers 5 and 6 took precedence on the Franco-British Front, and they appeared in use simultaneously.

The three types of Albatros biplanes in use in the month of August, 1914, were fairly well adopted for the uses of war, as conceived at that time, and the types of 1915 followed natural tendencies towards improvement, until the Military authorities decided to produce new types, namely, a small reconnaissance biplane and the fighting single-seater.

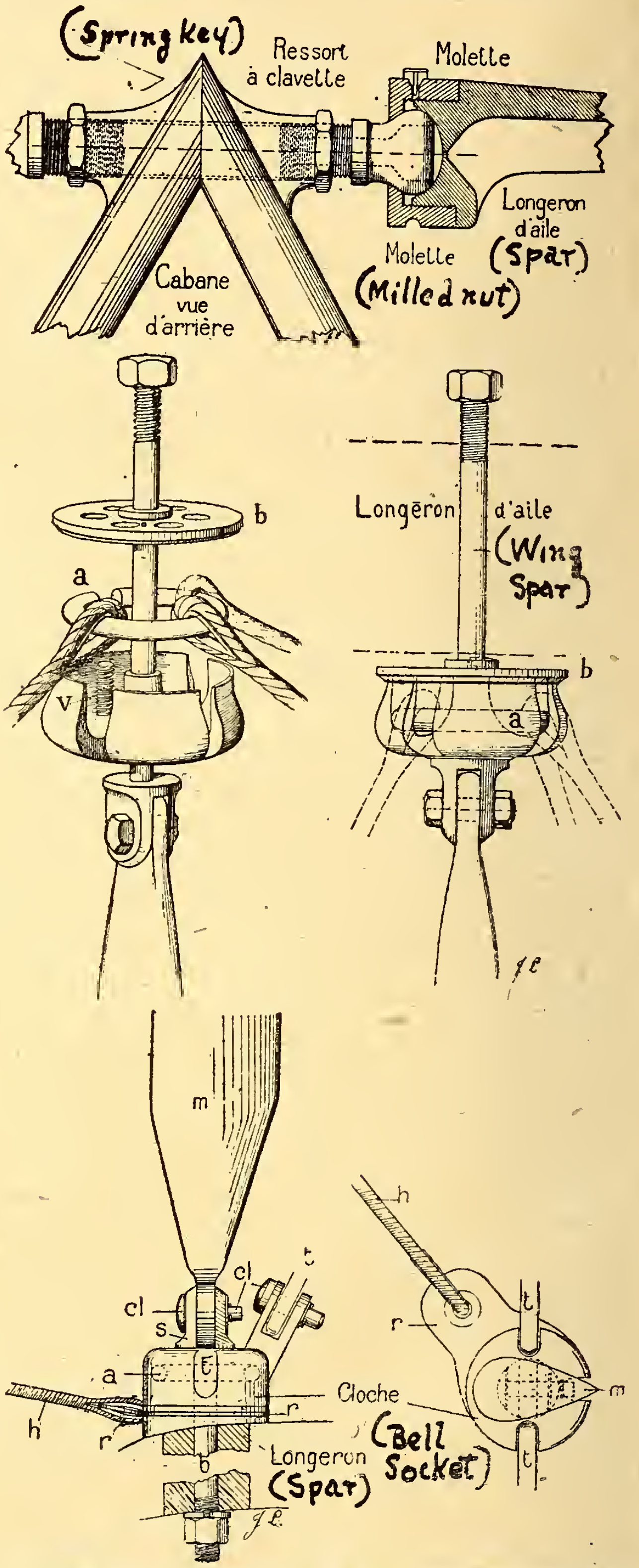
Of these types a number of examples have been captured in good condition from B.233, dated 1913, right up to the recent fighting single-seaters, D.1/391-1916 (maker's number 2944), etc.

The 1915, 13.1 m. span, machines have been the type mostly captured, and examples have been acquired on widely distant fronts, slight variations being found in the radiator arrangements.

Until August, 1915, the machine-gun ring did not appear.

The seaplane has been transformed into a land machine of the same span, with three pairs of interplane struts on either side, as in the 14.5 m. type. The ailerons of this machine measure 2.8 m. span by 0.55 to 0.65 m., as against 2.45 m. by 0.55 to 0.70 m. in the C.III type. This is one of the biggest German machines, but its use has been very restricted, as with all of their big machines. By constant evolution common to all German makes, the Albatros machines are becoming smaller and smaller.

The span of the lower wings of these biplanes is a little less than the upper wings. The span of the lower wings 15.1 m. of the seaplane, and the corresponding land machine is a little larger than the span of the upper wings of the 1913-14 type (14.5 m.), which remained in use a little longer.



The Upper Wing Attachment of the C.III type, and the Attachments of the interplane struts to the upper and lower planes of the 1915-16 types.

Again, the span of the lower wings of this machine (11.3 m.) is exactly the same as the upper plane of the reconnaissance biplane which succeeded.

TYPE 1913-14:—14.5 m./13.1 m. The height was 3.5 m., which in later types was reduced to 3.25 or 3.2, and their length 8 m., reduced to 7.9. The fuselages have remained the same length.

Wings.—Same chord (1.8 m.) as in type 1914-15 of 13.1 m., and as in the upper wings of C.III.

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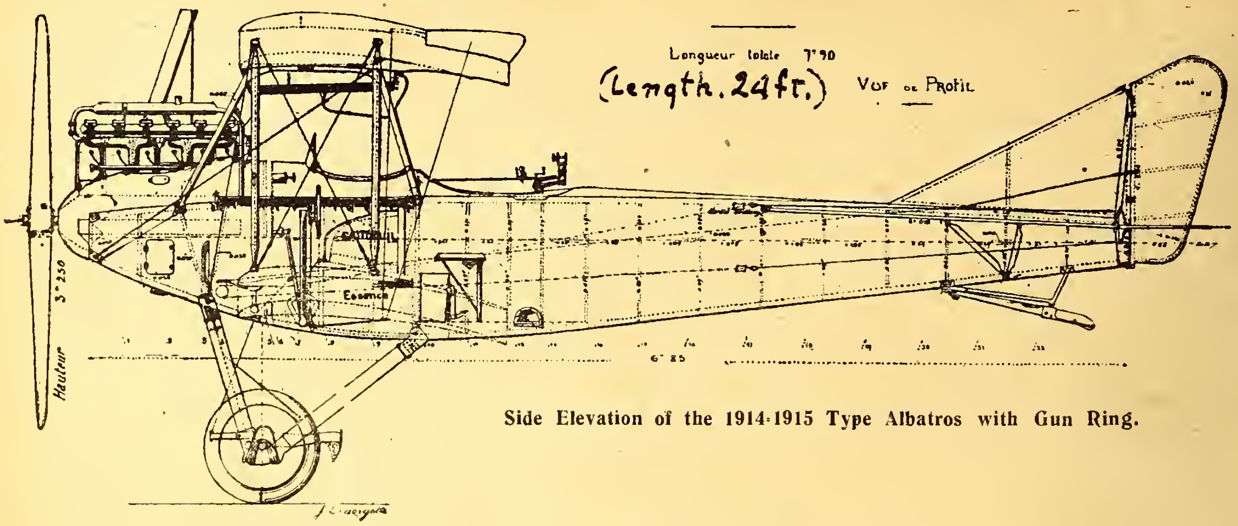
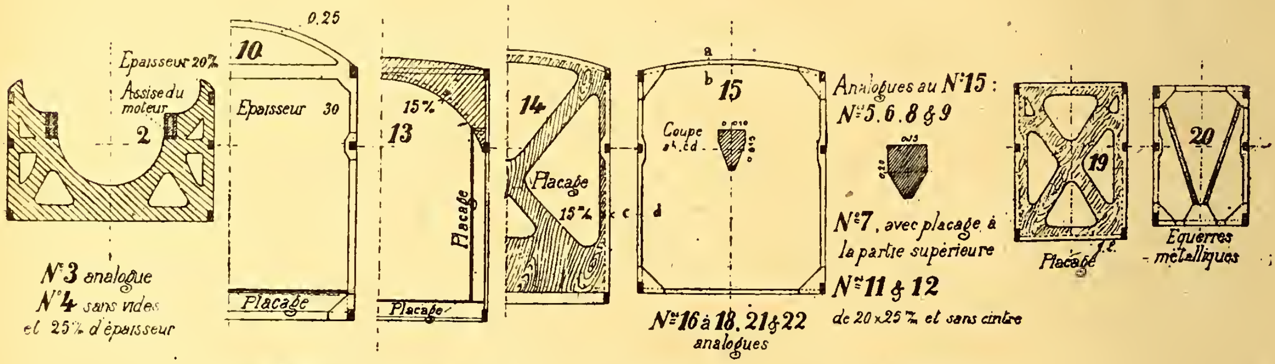


Side Elevation of the 1914-1915 Type Albatros with Gun Ring.



Cross-members of fuselage, as fitted at the vertical lines in the side elevation.

TYPE 1914-15.—The 1914 and 1915 models of 12.96 m. and 13.10 m. span differ only in two characteristics, apart from the suppression of the arrow (swept-back) wings and modifications in the control.

(1) The first contained no permanent arrangement for armament. The second was provided with a rear gun ring, an Albatros speciality, which has varied very little.

(2) Contrary to general German practice, in which the front and rear wing-spars have approached closer together, those of the Albatros remain almost as originally placed, but if this is apparently an exception, it is because they were comparatively close together in the earlier types, and hence the types of the different makers have tended to become uniform.

The total height remains the same (1.80 m.). The rear spar is placed 10 cm. farther forward.

The difference in the total height was due to the gap between the wings being reduced from 1.75 m. to 1.65 m. in later types.

In the small single-seater the gap has been reduced to 1.52 m., quite adequate for its span (1.62 m.)

The ailerons have a length of 2.4 m., and are 0.65 m. in depth. They were enlarged to 2.8 m. by 0.55 m. to 7 m. on the 1914-15 type, where they become somewhat like those of C.III and on the single-seater fighter D.I, where they are becoming smaller and smaller.

There were three pairs of struts (2.10 m.), even then of steel tube and streamlined, to each wing

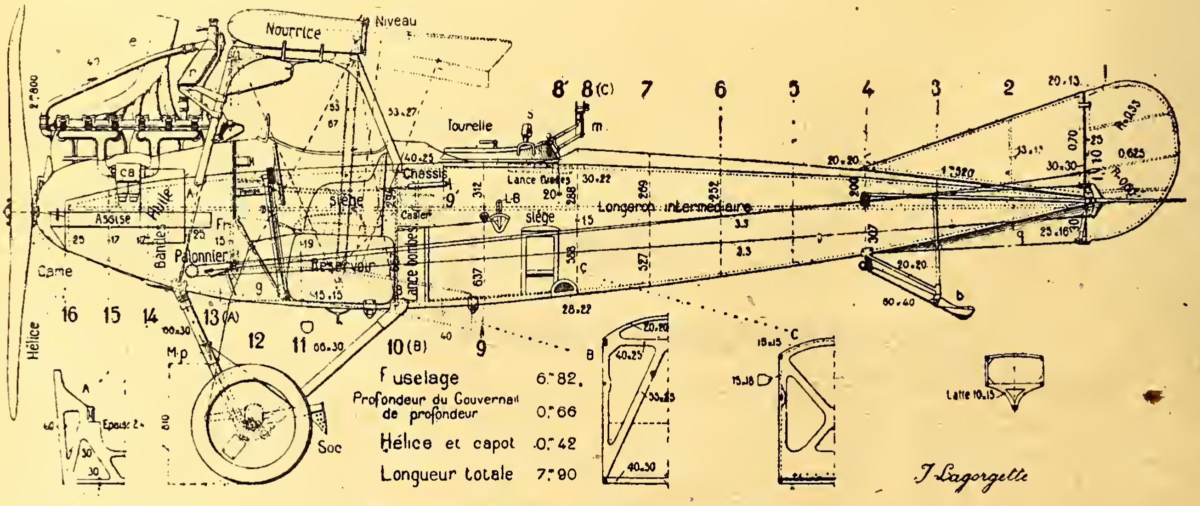
The fixed tail plane (1.60 sq. m.) and the elevator (0.6 sq. m.) had the same dimensions as the 1914-15 type.

The vertical fin had a smaller surface (0.50 sq. m.) than the 1914-15 type (0.7 sq. m.), and was 2 m. long by 5 m. high as against 1.6 by 0.9 m. in the C.III.

Rudder as in 1914-15, but more rounded than in C.III.

Fuselage as in 1914-15, but the back more rounded longitudinally than in 1914-15.

That portion of the wings which is unsupported at the back of the rear spar was originally much greater than that in front of it, and more particularly than the distance between the spars.



Fuselage	6'82.
Profondeur du Gouvernail de profondeur	0'66
Hélice et capot	0'42
Longueur totale	7'90

Side Elevation of 1916-17 Albatros (Type C.III).

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Then after having nearly equalled the latter dimension, it tends to return to the original proportion.

In any case, the unsupported portion of the wing remains fairly considerable, and not being devoid of a certain amount of flexibility, it assists in a certain measure towards inherent lateral stability.

The comparative dimensions of the three models are as follows:

Measurements of the 1914 Model.		1915 Model and Upper Wings of C.III.	Lower Wings of C.III.	Single Seater Fighter D.I.
Leading edge to front spar	.10m.	.10	.10	.10
Front spar to rear spar ...	.70m.	.80	.70	.80
Rear spar to rear edge ...	1.0m.	.90	.90	.72

The ailerons (the same span in either model) have, on the contrary, been brought double the distance back on the second model (1915), and have remained so on type C.III.

Their hinges, which were originally placed 0.65 m. from the rear edge of the wing (with rectangular ailerons of a uniform depth of 0.65 m.), were no more than 0.55 m. deep in the 1915 model, and moreover they increased obliquely to 0.70 m. wide towards the outer ends, their average depth and the surface being therefore scarcely reduced.

The cable on the 1914 Albatros, which, together with the rigid tubular strut, connected the extreme edges of the fixed vertical and horizontal fins, has been dispensed with on the recent models.

The motor, originally a 120-h.p. Mercédès, was later replaced by a 160-h.p. Mercédès. The exhaust pipe was turned upwards. To-day it is again placed obliquely downwards.

In the latest specimens a Mercédès honeycomb radiator has been adopted instead of the Hazet "venetian-blind" radiator.

Small Two-seater Reconnaissance Machine.

The little Albatros reconnaissance biplane shows all the characteristics of the present C.III type, and all that will be said of the latter applies to the former, except as regards the specified points set forth below.

Although not identical with the present-day C.III type (lacking a machine-gun), it has at any rate been to the C.III type what the Aviatik type P 1915 without a gun ring was to the present-day Aviatik.

Span, 11.30 m., instead of 11.75 m. in C.III type; resulting in a slight difference in surface, as the chord of the upper wings (equal to that of the lower wings) is 1.75 m., instead of from 1.81 m. to 1.71 m., the average being the same.

The rear interplane struts were vertical and parallel to the front struts; in the C.III type, because of the difference in the chords of the upper and lower wings, and of the spaces between the upper and the lower spars, the rear interplane struts incline backwards. This reduction of the lower plane, although not extreme in German types, is interesting as an indication, and not the only one, of recent French influence.

The tail members, both fixed and movable, remain about the same in area.

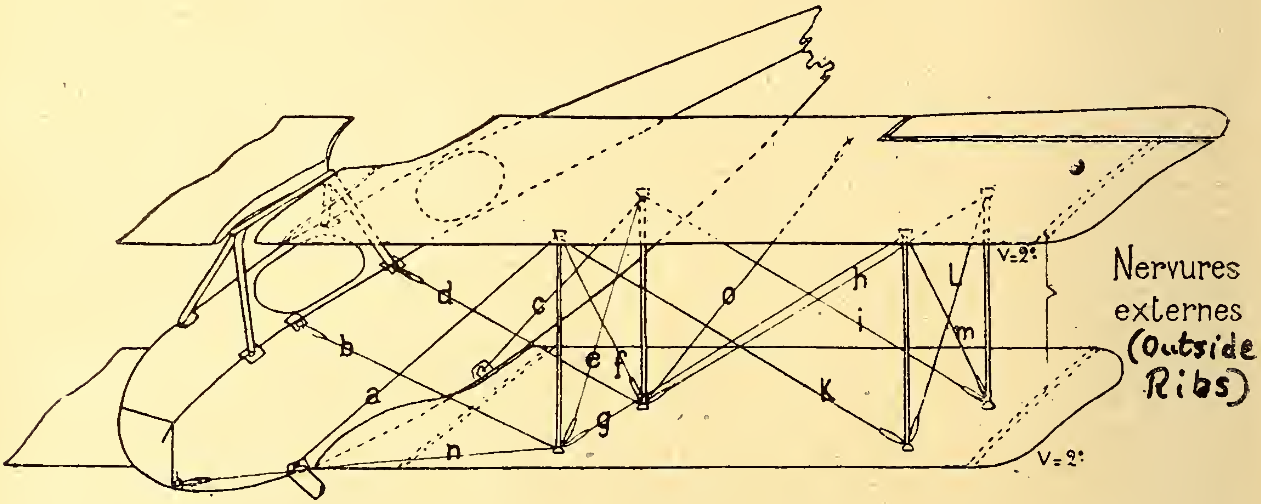
The drift cables from the nose of the fuselage were done away with (they have since been replaced). Two cables converged from the bases of the inner struts to the rear angle of the cabane, and one crossed from front to back, with the one which ran from the front of the landing carriage.

Contrary to the 1914-15 type and the C.III type, and as in certain of the early Albatros machines, the observer was placed in front without any special arrangement for armament, but with a wireless telegraphy plant.

The engine was a Mercédès with six cylinders cast in pairs, and was only of 128 h.p.

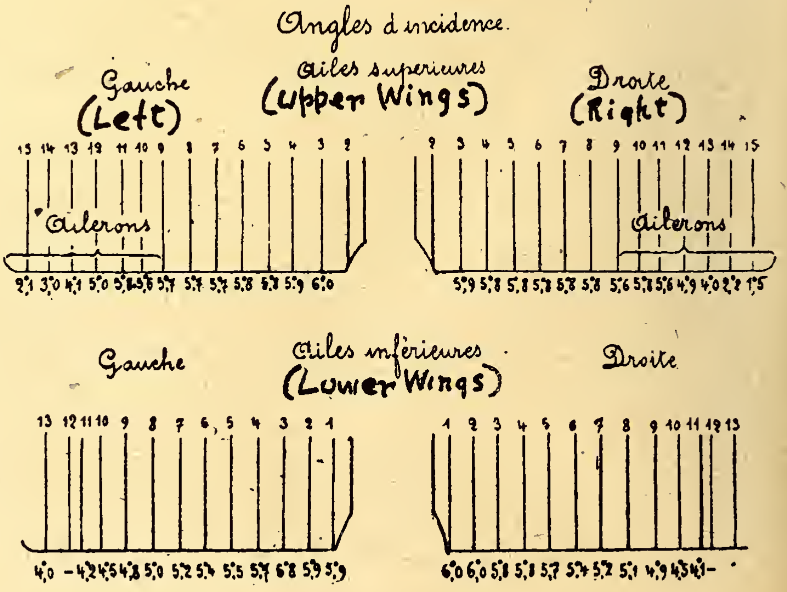
The radiators were still of the Hazet type, flanking the fuselage.

The exhaust consisted of a horizontal chamber, in shape a corrugated truncated cone with a vertical pipe.



Flèche 0° (Arrow) V = 2° (Dihedral)

Cable	Diamètre	Longueur en m/m	Mesure de la sortie de la «cloche»
a	5,4	2198	à la sortie du godet de rotule
b	4,2	1670	" " "
c	6,0	2232	" " "
d	4,2	1725	" " "
e	4,2	1638	à l'autre cloche
f	4,2	1665	" " "
g	4,2	2895	" " "
h	4,2	2902	" " "
i	4,2	2790	" " "
k	4,2	2800	" " "
l	3,2	1683	" " "
m	3,2	1627	" " "
n	4,2	2004	à la sortie du godet de rotule
	3,2	1950	total: 59m.56.



Truing-up Diagram of the C.III type Albatros.

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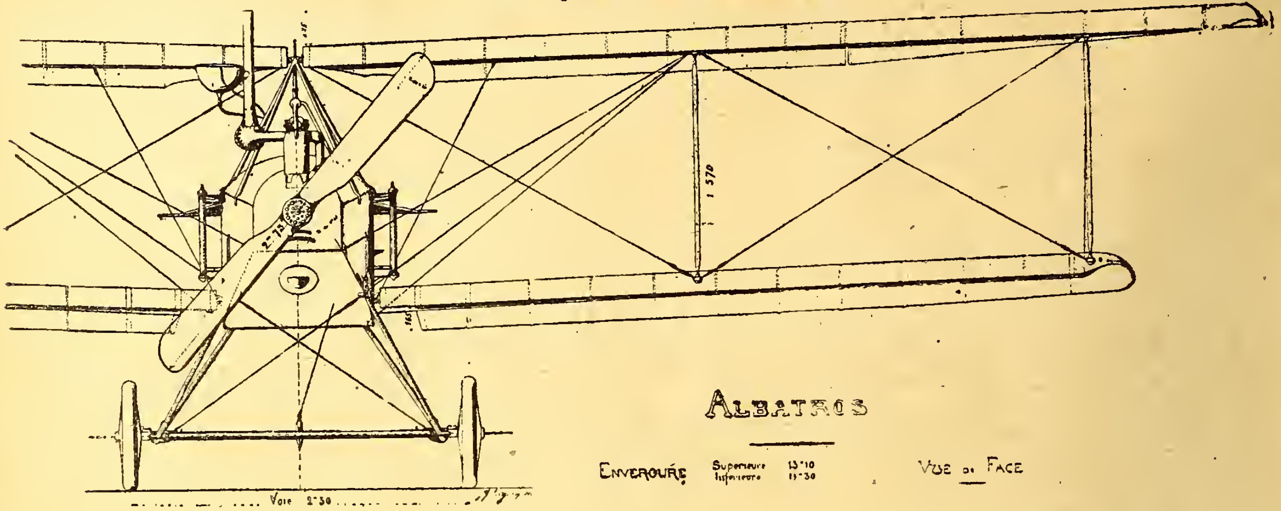
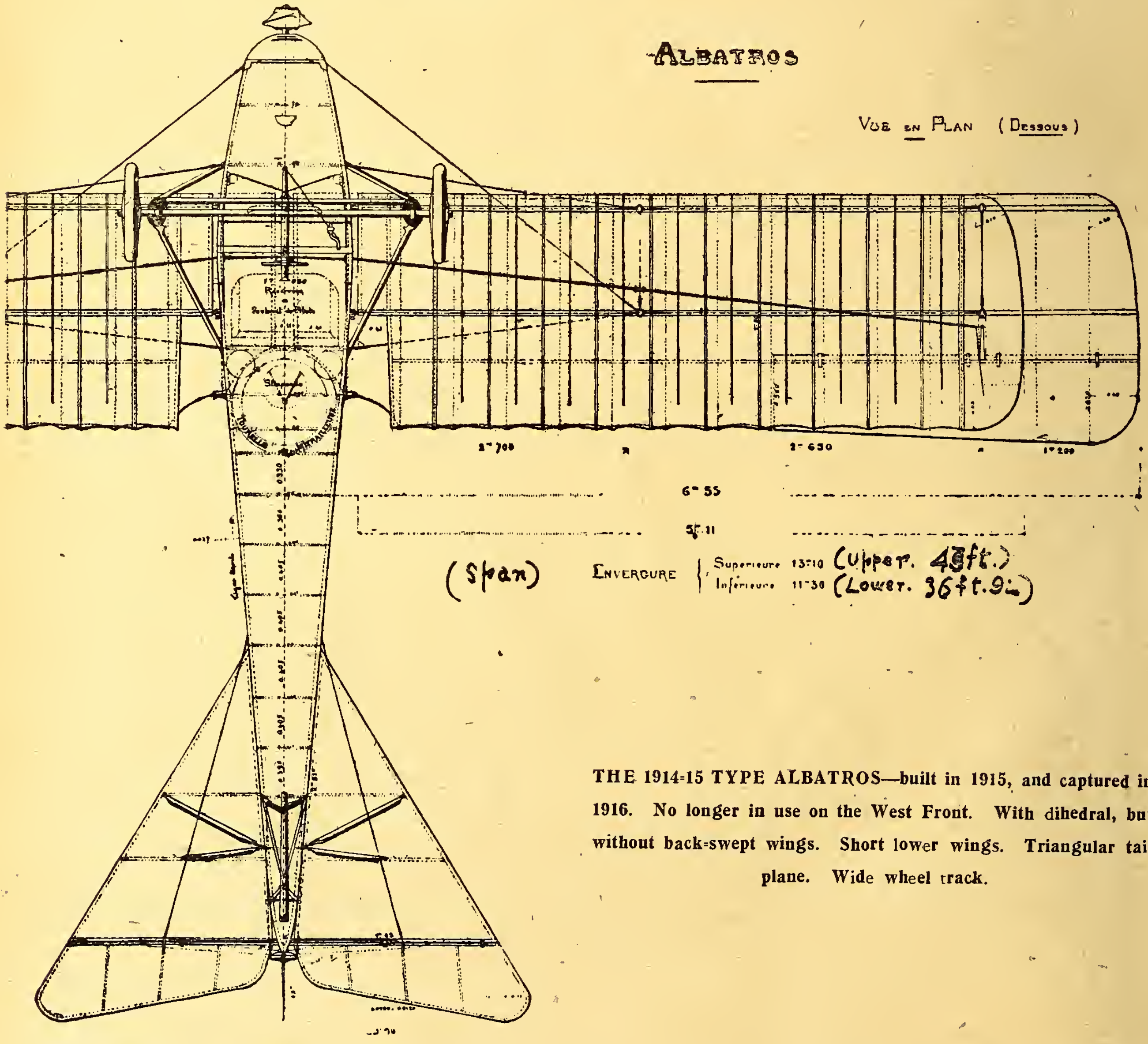


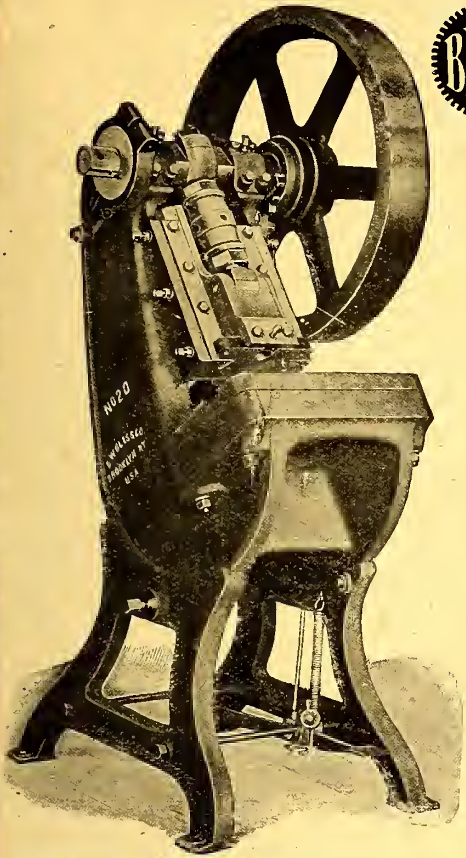


THE 1914-15 TYPE ALBATROS—built in 1915, and captured in 1916. No longer in use on the West Front. With dihedral, but without back-swept wings. Short lower wings. Triangular tail plane. Wide wheel track.

DIFFERENCES BETWEEN 1915 TYPE AND TYPE C.III 1916.

The arrangement and general form of the wings, fuselage and landing carriage of the two types is analogous, but the tails differ. The span of the lower wings, although having less chord, has become nearer that of the upper wings, and the structure of the fuselage is considerably altered. The following table affords opportunity for comparison.

Type 1915.	Type C.III 1916.
Total length: fuselage 6.85 m. + rudder 0.625 m. + cowl 0.42 m. = 7.90 m.	Has not changed since the original except for the lengthening of the rudder in the 1913 type.
Total Height: 3.25 m.	3.20 m.



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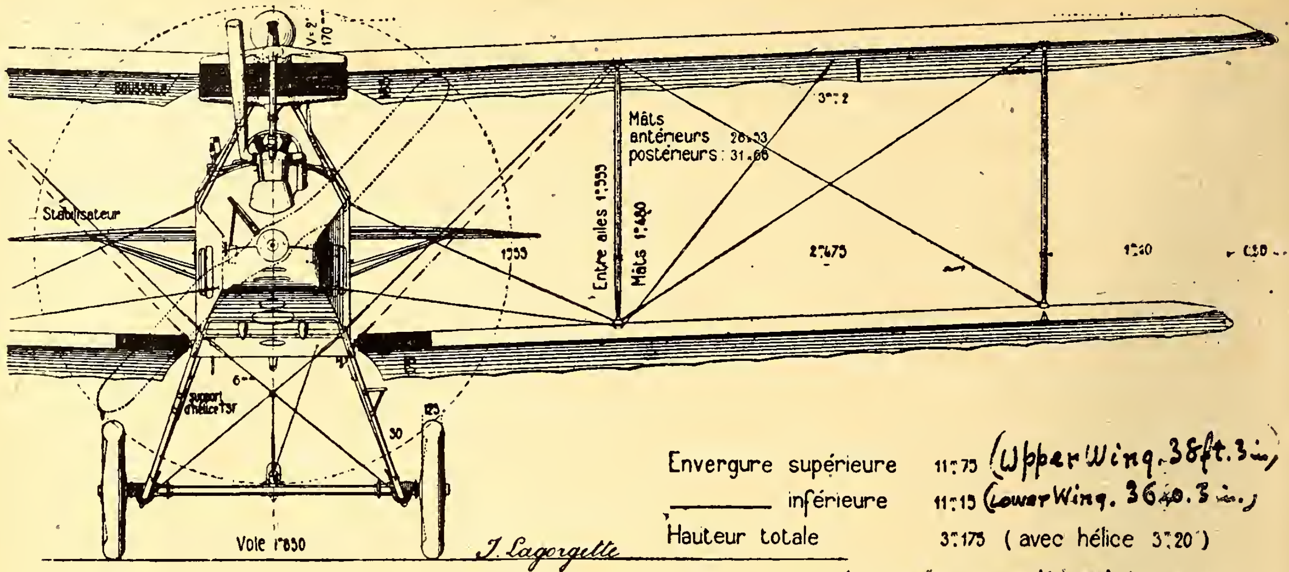
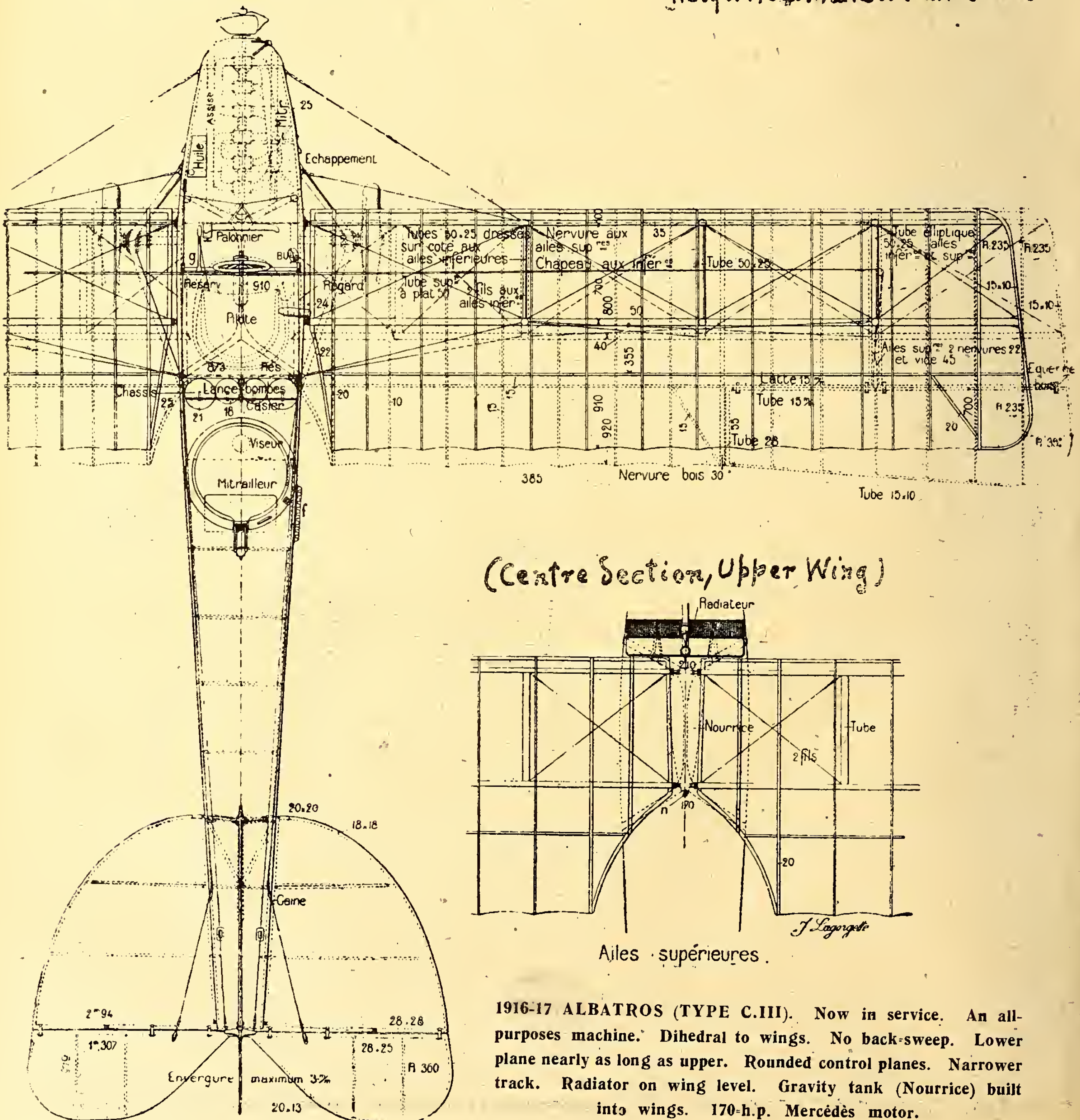


Envergure supérieure 11m75 (Upper Wing. 38 ft. 3 in.)
——— inférieure 11m15 (Lower Wing. 36 ft. 3 in.)
Hauteur totale 3m.175 (avec hélice 3m.20)
(Height. 10 ft. 6 in. with air-screw)



1916-17 ALBATROS (TYPE C.III). Now in service. An all-purposes machine. Dihedral to wings. No back-sweep. Lower plane nearly as long as upper. Rounded control planes. Narrower track. Radiator on wing level. Gravity tank (Nourrice) built into wings. 170-h.p. Mercédès motor.

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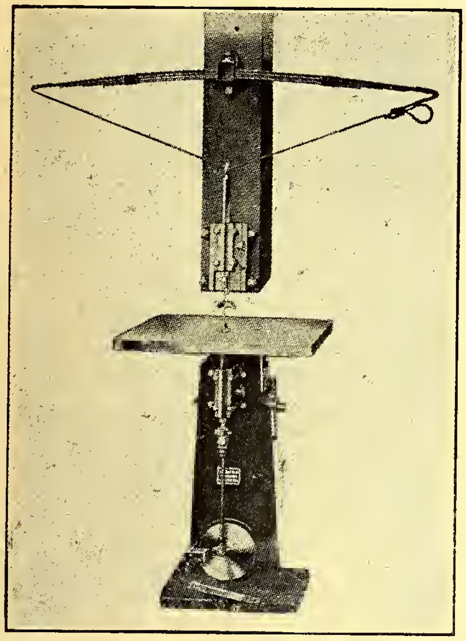

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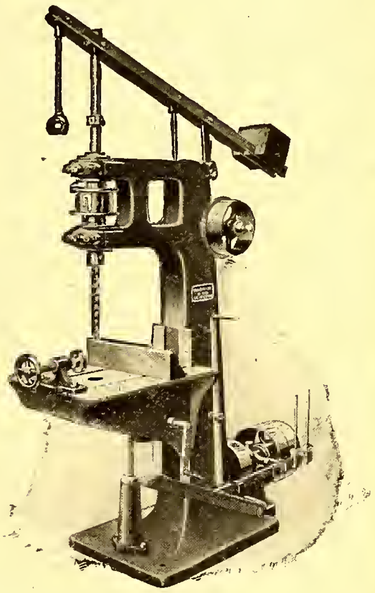

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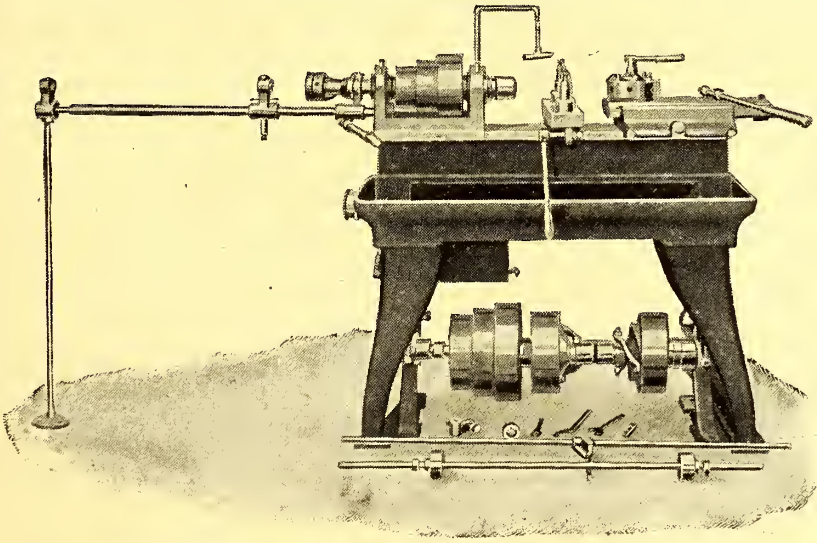

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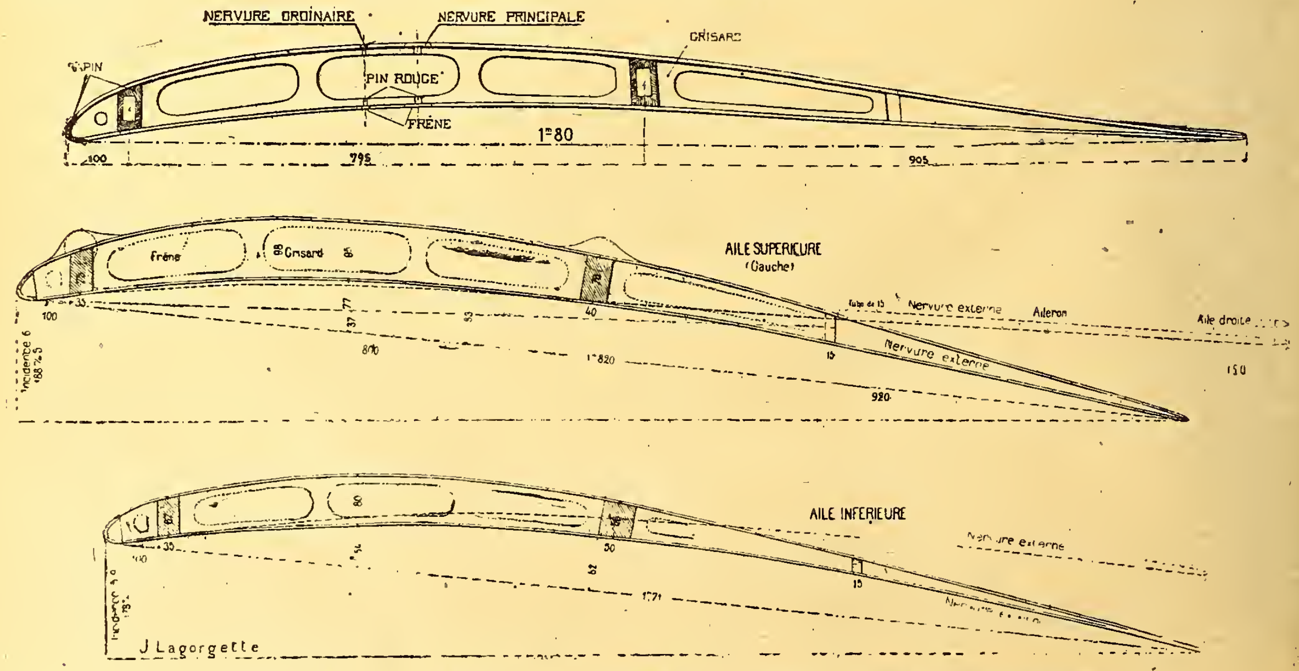
Type 1915.	Type C.III 1916.
Wings: Upper—13.10 m. span.	11.75 m.; a reduction has taken place in the upper wing only.
Lower—11.30 m. span.	11.15 m.
Overhang of Upper Wing: 0.90 m.	0.30 m.
Chord: 1.80 m.	Upper, 1.81 m.; lower, 1.71 m.
Surface (including ailerons): 22.60 + 17.60 = 40.2 sq. metres.	19.75 + 17.25 = 37.50 sq. m. The lower wings have retained the same surface.
Distance between wings (gap): 1.57 m.	1.55 m.
From the centre of the machine to the inner struts: 2.66 metres	2 metres.
From the inner struts to the outer struts: 2.65 m.	2.48 m.
Beyond the outer struts: upper wings: 1.20 m.	1.40 m.
Beyond the outer struts: lower wings: 0.30 m.	1.10 m.
Outer edge slightly rounded and thick, and sloping off gradually.	Rectangular, thin, and cut off sharply.
Dihedral: 0.25 m., or about 2.16 degrees.	2 degrees, or 0.15 m. to the outer struts, or 0.170 to the outer ribs.
No arrow angle (or sweep back) to the planes, nor has any other Albatros since the commencement of 1914, contrary to the older Albatros types and other German machines.	(The single-seater fighter has neither arrow planes nor dihedral.)
Ailerons: 2.80 m. × 0.55 to 0.65 = 1.65 sq. m. each.	2.45 m. × 0.55 to 0.7 = 1.5 sq. metres each.
Main wing spars, built up of two spruce, channeled sections covered with fabric.	Fabric covering wound spirally
Intermediary stringers on the top surface of the plane alternate with the main ribs, extending from the leading edge to within 0.2 m. of the trailing edge, where it may freely move.	The intermediary stringers do not extend past the rear spars.
Interplane struts, stream-lined, 53 mm. × 27 mm. Rear inner strut only round.	Same struts, except the inner rear strut, which is larger, 67 × 30 mm.
One cable runs from the nose of the machine to the top of the front inner strut. Two others pass from the upper angles of the cabane to the bottom of the inner strut.	The first cable has been brought down to the base of the front inner strut, and the others now run from the bottom of the cabane struts (from a point level with the upper fuselage members) to the base of the inner struts.
Elevator: 3.80 × 0.625 m. = 1.55 sq. m.	3.0 × 0.645 = 1.3 sq. metres

Type 1915.	Type C.III 1916.
Fixed tail planes, not counting area of fuselage interposed, two (1.57 × 2.30 m.) = 3.6 sq. metres.	1.30 span × 1.52 length, plus the wider fuselage = 3 sq. metres.
The incidence of the fixed tail plane was adjustable. The front edge could be fixed in one of the three holes superimposed and altered over a distance of 0.15 metres. The tubular struts from the fuselage being adjustable.	The incidence of 55 mm. (about) or 2.4 degrees is fixed. The 2 tubular struts, nearly parallel, cannot be lengthened any more.
The rudder: height, 1.2 high × 0.625 deep = 0.6 sq. metres.	1.10 high × 0.625 deep = 0.60 sq. m.
The vertical fin: length, 1.6 × 0.90 height = 0.72 sq. metres.	1.52 length × 0.70 height = 0.53 sq. m.
Its rearmost point was behind that of the tail-plane.	It is in the same line.
In the 1915 and earlier types the hinge of the rudder is behind that of the elevator.	On the contrary the hinge of the rudder is in front. (In the single-seater fighter D.I the rudder is entirely in front of the elevator.
A heavy strut connects the vertical fin with the fixed tail plane.	Being more stumpy (after having been still more so in the reconnaissance biplane), there is no longer need for this strut.
Fuselage: length, 6.855 m. Same maximum breadth and height.	6.8 m.
The fuselage tapers vertically and terminates behind with a vertical edge. The curve of the lower side is less pronounced than in type C.III.	Tapers horizontally with keel, forming a *T* at the back. The under-side is rounded longitudinally.
The 6 fuselage longerons were of pine, except for the 4 principal members in front of the gun-turret, which were of ash.	Only the 2 upper longerons in front of the gun-turret are of ash.
Motors: Mercédès 100 h.p. Then 150 h.p. Hazet radiators, except in last specimens, along sides.	165-175 h.p. Mercédès, with the firm's own radiators on level with upper plane.
Gravity tank below upper wings.	Gravity tank in centre wing section.
Exhaust, several pipes downwards. Then pot and pipe turned upwards.	Six pipes converging into one upwards.
Controls: Aileron cables partly outside opposed to the air. Elevator control by two solid sectors on the wheel-pillar.	Aileron cables inside wings.
Bomb-gear: In 1915, two steel cylinders, 0.18 m. inside diameter in front of passenger left and right, with pedal release gear.	Four bomb cylinders, with hand-operated release-gear.



ALBATROS WING SECTIONS.—1915 type above. 1916-17 type in two lower sketches.

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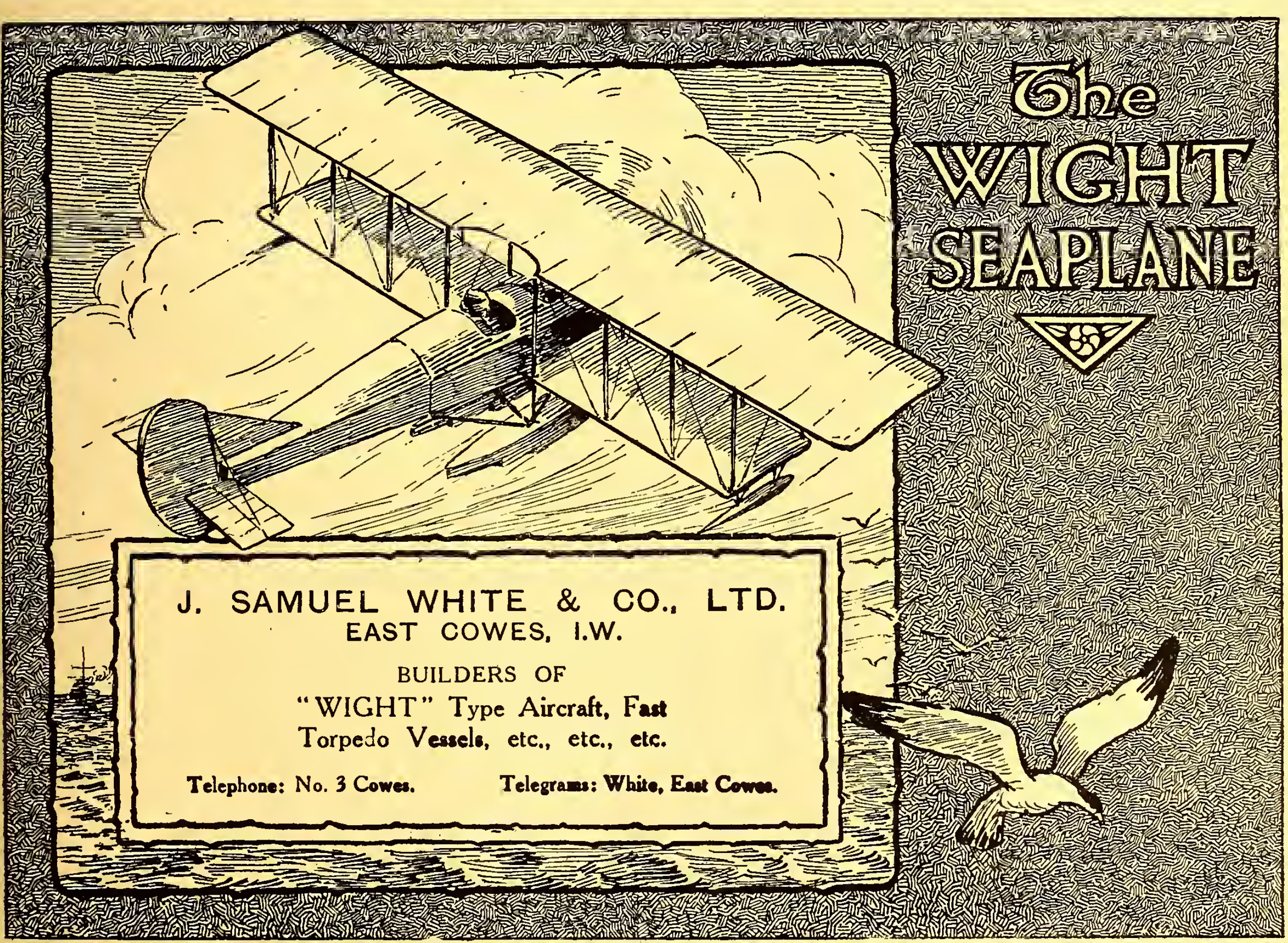

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PARAFFIN IN MOTORS.

Old Ways and New Adaptations.

There are two accepted ways of carburating the so-called "paraffin" which is known everywhere but in England as kerosene; namely, atomisation and vaporisation; and two even less known, the combination of both, and the "bruising" method, between two metallic surfaces.

So rarely has this last ever been practised that it has been all but forgotten. Motorists who remember the original Gobron-Brillie will recollect that instead of having any sort of carburettor, its induction was fitted with a coned funnel, in which, as a seating, was mounted a metal cone with a series of tiny cups formed on its coned surface. And that the said cone, being fed with petrol, was mechanically rotated at the same speed as the motor, so that the petrol was bruised to a thin vapour between cone and seating.

Now this arrangement was so effective that although one needed to start up on petrol, a minute's running used to enable it to take kerosene just as well; as the bruising completely atomised the heavier fuel, while the warmth acquired by the motor kept it vaporised. So much so, that had two of the devices been fitted, one to each inlet passage, it might well have been possible to start up on kerosene from all cold: all the more if it had been geared up to run twice as fast as the motor.

All this is such ancient history that someone is sure to reinvent this apparatus, or something like it. And, then, when he has paid his money to complete his specification, he will be pleasantly astonished at the number of citations of other devices embodying the same principle, that will be made against his twice-born.

Let me, then, put such an one up to a trade-wrinkle. Thirty shillings will enable him to stamp it "Patent applied for," with no earthly idea of carrying it further, but just to stall off competition and encourage the war-weary delusion that the Government want it, or anything so likely to be useful. Then let him waste no more money in Quality Court, E.C., but manufacture his bruiser, run it off the cam-shaft or pump-spindle end, advertise it as a novelty largely, and sell it very expensively.

The motoring public, who value a thing only by its heavy cost, like it that way. And there's many a good tune played on an old fiddle.

As to the combination of atomisation and vaporisation, I can recommend it also as a basic principle of legalised bluff patents, because the former, as a preliminary, makes the latter easier as an accomplished fact.

As to Atomising.

Satisfactory carburation by atomisation alone, on the other hand, is possible in just one way, because though the atomisation part is easy enough, the difficulty—nay, practical impossibility—is to carry the stuff farther than a few inches in an atomised condition. That way, then, is direct injection into the combustion chamber at—or below—the top of the compression stroke, in a duly measured amount. Do not forget, however, that the air-volume must be simultaneously regulated. In which two dreadful words lies all the difficulty.

Even then, there is a way. Invent some device by which, from a constant head of delivered kerosene, the exact dose is automatically blown in to the combustion-chamber, injector-fashion, by the air under compression, and automatically regulated by the degree of that compression. So that having once set your fuel-supply valve, you need only throttle on your air. You will get your carburation all right. Also a writ for infringement.

So, too, if you embody anything like a Lunkenheimer valve—the a.o. mushroom-type with the kerosene admitted on the seating—in any combined atomisation-vaporising device. Otherwise, your liberty is absolute in that direction of effort. Except that you really must not play about with electricity and fire-clay.

There is also the venerable method of directly injecting the kerosene into a hot metal bulb atop of the cylinder: the throw of the pump being varied—but not its speed, which is constant to the motor speed—to vary the amount injected thus. This is the way of a dozen different heavy-duty marine motors; and there is nothing more reliable for marine work. I question, however, if it could adapt itself well or safely to aviation, despite the constant speed; while I have the strongest doubts of its suiting the conditions of road-work.

And Vaporisation.

On the whole, then, the line of least resistance and greatest success—and I believe for aviation in the early future, as much as for motor-car use in these days of petrol regrating and forestalling—lies in the direction of pure vaporisation.

It certainly appears to be an easy way, if you judge from the number of newly advertised methods which marine-motor experience tried years ago and condemned as failures, yet are expected—or, at least, claimed—to succeed on the road.

The Chief Essential.

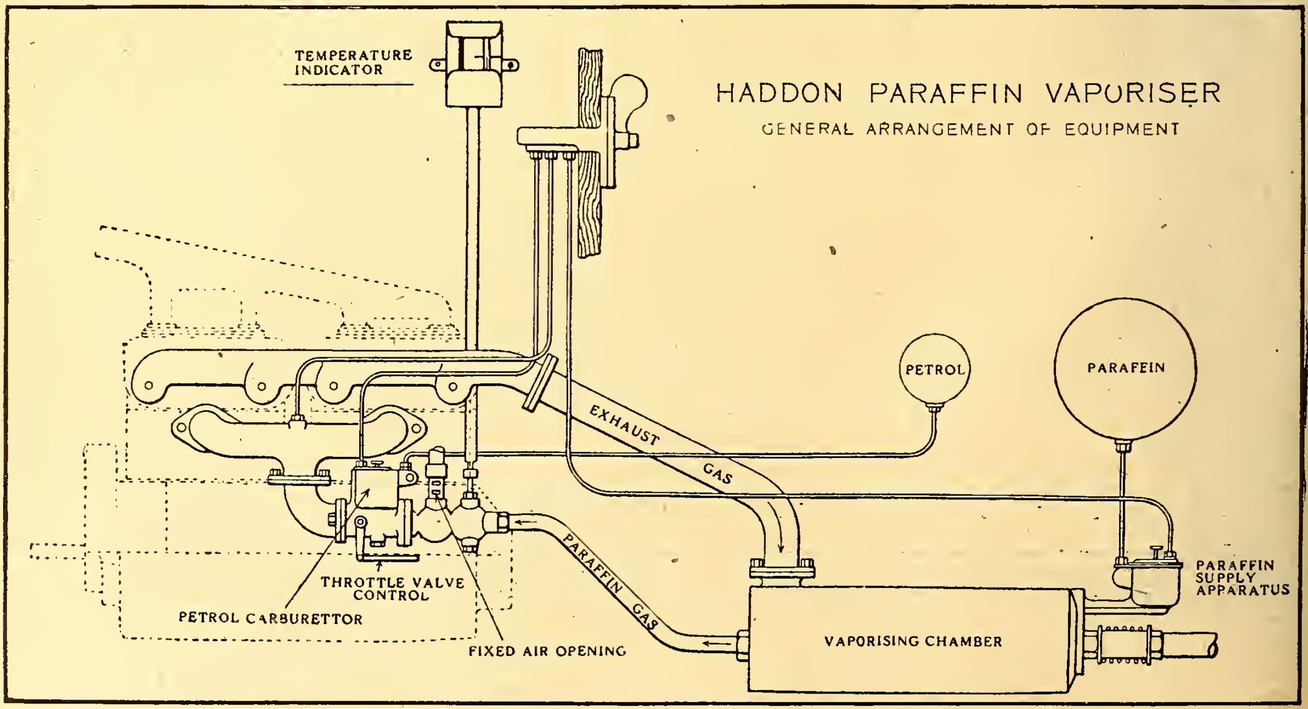
Doubtless there are others quite satisfactory as well as the one I am minded to discuss chiefly. But the criterion of all—which this one so notably represents—is that to be truly satisfactory the device must, in the first place, vaporise every drop of the kerosene, and keep it just vaporised, but *not* cracked and prematurely burned. Secondly—albeit this consideration is equally important—the device must be able to deliver a volume of vaporised—that is to say, gasified—kerosene, of precisely the amount required under all variations of road-speed and motor-demand, *and no more*. Not the least extra whiff.

The Haddon System.

This characteristically successful device, then, is the Haddon vaporiser. To all appearances it is the same as the one that was invented some four or five years ago by a Roumanian oil-expert in London, to use the light-brown surface crude oils which are so frequently met with in the earlier yield of certain Roumanian fields. Especially those on a limestone formation, which acts as a natural still, giving off the lighter constituents first.

All this by the way; but as it was introduced in the days when we all dreamed we were going to have petrol for ever—or as long as the Trustees cared to send it by leave of the Potsdammerstrasse—nobody took the trouble to encourage it adequately.

Now that our entire petrol-stock—as an incidental fact twice as much as ever came to British ports before the war—is required, as to about half of it, for actual naval, military, and aviation needs, and the rest is divided between restricted public-service vehicles and unrestricted departmental motoring—we need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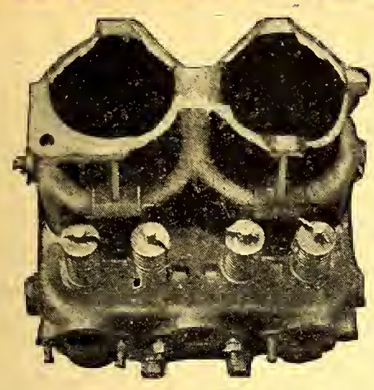

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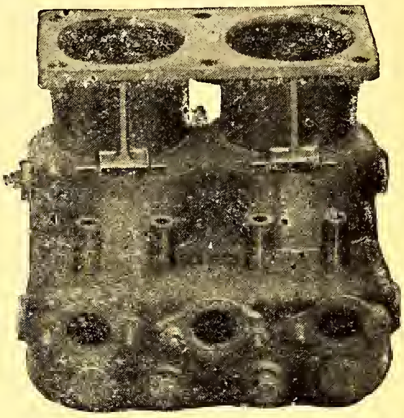

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a reliable device such as the Haddon vaporiser urgently. All the more because of its improvement, since the last three of its eight patents since 1911 are dated 1916.

Which—easy as the gasifying of kerosene seems in the abstract—shows how much research and experiment is needed.

SOME CARBURETTOR DIFFERENCES.

Now it should first be understood that even the carburettor part of the Haddon kerosene vaporiser only resembles a petrol carburettor very slightly. Functionally, it is entirely different.

The average petrol carburettor is not—and need not be, to be quite efficient—any more than a mist-producer. But no such device, however exhaust-heated, or adapted, is adequate for kerosene carburation.

The successful device must—and can—only be a gasifier, for the mere mist-producer cannot convert the heavy particles of kerosene into a combustible gas. If such a makeshift be used, it will only gasify some of the kerosene. The rest will be carried over whole and cracked on the hot parts of the motor. Then the resultant hydrogen will combine with the free oxygen of the air, form water, and rust the valves on their seatings.

AND THE HADDON WAY.

Thus the success of the Haddon vaporiser is fundamentally due to its being essentially a gasifier, gasifying all the kerosene. This assured, variations of speed and load can be otherwise dealt with.

Now it is obvious that any gasifying device—except a wick-carburettor, such, for instance, as the original Lanchester, which would not be adequate for any non-volatile fuel—depends on some initial heat-supply: as from starting up on petrol.

The Condon patent petrol carburettor has therefore been chosen, not only because it affords such a starting medium, nor so much because of its special design to assure easy starting, automatically correct mixture and so forth, but because the peculiarity of the design is that the throttle chamber and induction trench lies beneath, so that the single passage and throttle serves alike for petrol-mist or gasified kerosene, thus avoiding duplication and simplifying control.

THE COMPONENTS: AND REASONS THEREFOR.

Then, too, like the kerosene supply-float chamber, its delivery can be controlled by one or other of the three vacuum pipes leading to the dashboard, which, together, constitute the change-over part of the Haddon apparatus. For the moment one of these is cut out at the dashboard, the other is opened. Hence the suction in the latter obviously will create a minus pressure in the former, be it the petrol or the paraffin connection. This at once operates on the float and closes down the needle valve hard into its seating to cut off the supply.

The third important part of the Haddon apparatus—which is really the heart of it—is the vaporising chamber. This is actually the exhaust-silencer in all respects, with certain additions. There is the usual perforated central tube, which, of course, serves for the passage of the hot exhaust gases, and therefore acts as a heating tube for the concentric space between the tube and the outer walls of the chamber which are duly lagged with asbestos, metal-sheathed so as to retain all the absorbed heat.

The additions are that this space is filled with heat accumulating fragments of metal with a semi-catalyst function that the chamber is sleeved backwards around the central tube to carry a bracket on which the kerosene float-chamber is mounted: that the latter is connected to the perforated central tube: and that the front end of the chamber is connected by a tube to a hollow bi-globular casting embodying a thermostatic device in one globular portion, and an air supply chamber fitted with a setting-sleeve in the other: this casting giving free passage to the throttle chamber.

HOW THEY WORK.

Now it will be clear that when the change-over has been made—or even the shift to mid-position, when both petrol and kerosene are being fed in—the suction from the motor will be drawing clear through the vaporising chamber to the kerosene supply.

This suction reacts upon the diaphragm at the top of the latter, and lifts the needle-valve carried by that diaphragm. Naturally, therefore, the degree of suction automatically regulates the amount of kerosene allowed to flow past the needle into the perforated tube.

In this, the first stage of gasification, the kerosene is broken up into drops by the tube perforation; and thence, for the second stage, these drops are drawn upon the heated masses of loose metal, on which they form a film, and so are gradually converted into a homogeneous gas, of an even temperature.

AND THE RESULTANT GASIFICATION.

Clearly, in these conditions, no more kerosene is, or can be, gasified than is wanted for the immediate needs of the motor. Thus the chief qualification of a practical gasifier is duly satisfied. However, should the motor be stopped for any reason, there is always some unused oil-gas left in the chamber for restarting. Also the heat-accumulating masses remain hot for some considerable time, so that, unless the motor is stopped long enough to get cold, there is no need to switch over to petrol for restarting.

At this stage the heat indicator shows the condition of the oil-gas between extreme limits. But it is naturally too rich for explosive combustion until duly impoverished with the air—with which, both being gases, it readily forms a mechanical mixture—that is drawn through the air-sleeve above the mixing chamber. For cold weather this sleeve is usually connected by a flexible tube to a shrouding-piece round the exhaust pipe, and the outer regulating sleeve rotated until closed in the usual way.

Otherwise the air-supply remains of stationary volume: and a constantly proportioned mixture is drawn into the motor. Personally, I differ from the practice of the Haddon apparatus in this one detail, believing, as the result of my experiments, that the air-supply should be slightly varied—simultaneously with the throttle movement regulating the mixture-supply—according to the motor speed, load, and consequent demand: not only for the sake of fuel-economy, but to obtain greater power and flexibility. Much as the most advanced petrol carburettor practice prescribes for the same reasons.

THE PROOF OF QUALITY: RESULTS.

In these conditions, at any rate, it becomes evident that the response of the motor to the supply created by its own demand, must be immediate. And the vaporiser being thus adjusted to the motor and not *vice versa*—the compression being also unaffected—the explosive mixture supply will remain constant at variable loads and speeds. Thus neither climatic variations nor anything else affects the gas-production; and there should, on the other hand, be no flooding or cloud of excess oil-gas, since it cannot be produced in excess of the motor's already-declared needs.

This way, of course, lies not only economy in actual gas production and use, but certain reliability—all effected by the simplest of means—in the use of kerosene as the more economical fuel. The one petroleum product, be it noted, which always exists in the greater percentage, in the average of crudes; and therefore must always be more or less cheap. What seems to be most needed—as the next development of the Haddon vaporiser—is to adapt it to the use of aviation, which in practically all verticals and most V-types, should not be very difficult, so long as silencing is not effected at too great sacrifice of power. There may be other possibilities, but this one stands proved on results.—G. DE H.-S.

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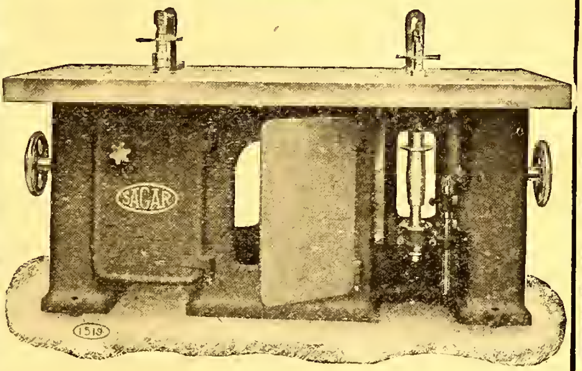

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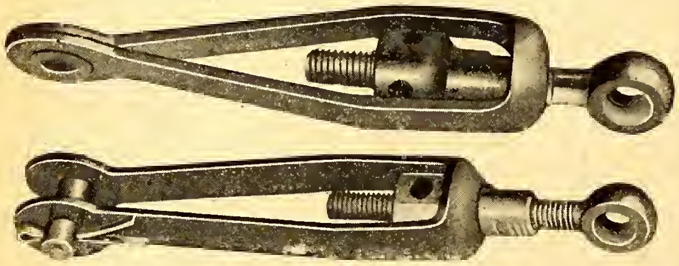
THE "AVRO" PATENT BARRELLESS TURNBUCKLES.

This turnbuckle, which is the subject of British patent No. 17740/1915, is the product of Messrs. A. V. Roe and Co., Ltd., who are also the patentees of the same, and is at the present time being manufactured in two sizes, full details of which are shown on the appended schedule.

As will be seen from the schedule, two strengths of turnbuckles are being made at present: Marks "C" and "D" with a breaking load of 1,216lbs., and Marks "E" and "F," which fail at 1,950 lbs. Other strengths will be manufactured in due course.

The turnbuckle has already been approved by the Aeronautical Inspection Department for use for internal bracing in place of other strainers or turnbuckles, where the strength is not less than that required, and consequently, on reference to the schedule, it will be seen that these two sizes at present being manufactured are equivalent to the Admiralty type No. 252 and the R.A.F. types A.G.S. 140, 141, and 142; also to the Binet type strainers 4 by 44 mm. and 5 by 30 mm.

The supplies at the present time of these latter types of turnbuckles are, as manufacturers know, not nearly equal to the demand, while considerable difficulty is being experienced at the present time particularly in regard to supplies of the R.A.F. turnbuckles, and more especially, perhaps, A.G S. 140. It may be mentioned that, as will be seen from the price list included in the schedule referred to, the Avro barrelless turnbuckle comes out no less than one-quarter the price of the Admiralty and R.A.F. types, and the price is rather less than for Binet type strainers.



Many novel and ingenious features are incorporated in this turnbuckle, the following being particularly worthy of note:—

(a) There is only one threaded shank and no internal threaded barrel. Hence this turnbuckle can be manufactured in approximately half the time of the standard type.

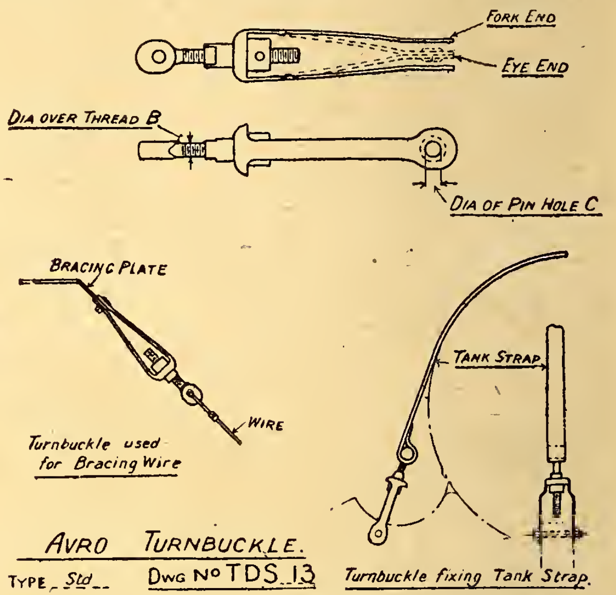
(b) No delta metal and no steel bar to R.A.F. specification 1.D. are employed in its construction, and since these materials are both very difficult to obtain at the present time, again the manufacture of this turnbuckle is thus facilitated, while the elimination of the materials mentioned enables considerable reduction in the cost of these parts.

(c) All eye-end bodies are ferruled as shown, while those of the forked-end type are supplied complete with pins and split pins, also as shown, ready for direct attachment to the bracing lugs.

(d) In operation, this turnbuckle is extremely simple. Adjustment is effected by rotating the nut, which is provided with small flats to take an adjustable spanner or key. A special Avro key is supplied free of charge with every consignment of turnbuckles. Locking is effected by a locking wire being passed through two of the small holes in the nut and around one limb of the body stamping, with which the two free ends are twisted together. If desired, the wire may be led up through the eye of the bolt, but in practice this has not been found essential.

(e) Attention is particularly directed to the conformation of the cup of the stamping, which is a form of universal joint, and therefore relieves the screw thread of any bending load which is liable to occur when a forked end turnbuckle is used.

(f) The Avro barrelless turnbuckle is the lightest turnbuckle extant, yet, while fulfilling the ordinary functions, is applicable to many special circumstances. This is rendered possible by reason of the body being in the form of a stamping. It may be distorted in numerous ways to suit special purposes, and can be applied for the securing of tank straps to body rails or engine bearers. For these purposes it has been approved by the Aeronautical Inspection Department and the Air Department. No doubt other uses will suggest themselves to aircraft constructors when samples are inspected. In this case, a special T bolt takes the place of the eye-bolt, while it should be noted that a special long shank bolt can be supplied to adapt these turnbuckles for the adjustment of control cables.



(g) The Avro barrelless turnbuckle has been submitted to exhaustive tests, and, while being approved for use on Avro machines, is also approved by the Aeronautical Inspection Department for internal bracing and other uses, but which for the time being should be submitted to the A.I.D. in the usual way before being employed.

At the present time quantities of these turnbuckles are being supplied, and the manufacturers are, with the co-operation of another firm, using every endeavour to increase the output as much as possible.

Samples and supplies of these turnbuckles may be obtained from the Aircraft Supplies Co., Ltd., 17, John Street, Theobald's Road, London, W.C., who have been appointed by Messrs. A. V. Roe and Co. as the sole selling agents.

Mark	Size	Type of Ends.	Breaking Load	Dia. of Pinhole.	Per 100	(500 to 1,000) per 1,000	(Over 1,000) per 1,000
					s d	£ s d	£ s d
C.	4 m/m	B.C.E. (Double Eye)	1216	-	72/8 (= 8.7d ea)	34.14.5.(= 8.33d ea)	33.17.1.(= 8.125d ea.)
D.	4 m/m	A.B.C. (Fork & Eye)	1216	3/16"	s d 76/11(= 9.23d ea)	36.17.2.(= 8.85d ea)	35.18.9.(= 8.625d ea.)
E.	5 m/m	B.C.E. (Double Eye)	1950	-	s d 94/0 (=11.28d ea)	44.17.5.(= 10.77d ea)	43.15.0.(= 10.5d ea).
F.	5 m/m	A.B.C. (Fork & Eye)	1950	3/16"	s d 98/4 (=11.8d ea)	47.0. 0.(= 11.28d ea)	46.16.8.(= 11d. ea)

The above prices are nett.

Quotations for B.C.E. Types (Fork & Eye) Marks "D" & "F" include pin and split pin.

DELIVERIES:- Small quantities from stock.
Large quantities - Deliveries on application.

INSPECTION:- Passed by A.I.D. before delivery.
Guaranteed to pass Admiralty Inspection.

Equivalents.

Mark	Admiralty	R.A.F.	Binet.
C.	No. 252. (2 B.A.)	A.G.S.140 (4 B.A.)	4 x 4 m/m
D.	Do.	Do.	Do.
E.	Nil.	A.G.S.141 & 142. (2BA. Long & Short)	5 x 30 m/m
F.	Nil.	Do.	Do.

Table showing dimensions and details of the Avro Patent Barrelless Turnbuckle, and the equivalent sizes of Admiralty, R.A.F., and Binet strainers which it replaces.

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For the benefit of the more intelligent and patriotic aircraft workers, who are willing to divert some of their own time from trivial amusements to improving their knowledge of their craft and thus to improving the output of aeroplanes and airships in quantity and quality, with the ultimate effect of helping to win the war, a series of ten educational lectures on aeronautics has been arranged to take place on Thursday evenings at St. Peter's Hall, Cricklewood Lane, N.W.

The lectures will be given under the auspices of the Aeronautical Society of Great Britain, the hall having been lent by Mr. F. Handley Page, a member of the Council of the Aeronautical Society. The lectures will be illustrated by lantern slides and models, and each lecture will begin at 7.30 p.m., on the dates specified. Season-ticket cards admitting to all the lectures may be obtained free of charge from F. Handley Page, Esq., 110, Cricklewood Lane, N.W., or from the Secretary, The Aeronautical Society of Great Britain, 11, Adam Street, Adelphi, W.C.

The complete syllabus of the series is as follows:—

	Lecturer.	Subject.
I.—March 1st.	Bertram G. Cooper, A.F.Ae.S.; Major-Gen. R. M. Ruck, C.M.G., in the Chair.	**History and Development of the Aeroplane,** giving the historical milestones in the evolution of the aeroplane and an introduction to the first principles of flight.
II.—March 8th.	E. S. Relf, A.R.C.Sc., A.F.Ae.S. (of the National Physical Laboratory); Mr. F. Handley Page, A.F.Ae.S., in the Chair.	**The Aerofoil and Fluid Flow round Bodies, etc.** The behaviour of flat and cambered planes, lift, drag, and efficiency.
III.—March 15th.	A. Fage, A.F.Ae.S. (of the National Physical Laboratory).	**The Airscrew.** Theory and practice of the propulsion of aircraft.
IV.—March 22nd.	Capt. F. S. Barnwell, R.F.C.; Capt. G. de Havilland in the Chair.	**The Modern Aeroplane.** Giving the types and their performances, and probable lines of development.
V.—March 29th.	R. O. Boswall, A.F.Ae.S.	**Materials and Methods of Design and Construction of Aeroplanes.**
VI.—April 5th.	Lt.-Col. Waterlow, Wing Com., R.N.A.S.; Mr. Holt Thomas in the Chair.	**History and Development of Balloons and Airships,** as in the case of the Aeroplane.
VII.—April 12th.	Lt.-Col. Waterlow, Wing Com., R. N. A. S.; Mr. Griffith Brewer, A.F.Ae.S., in the Chair.	**Constructional Materials.** Methods and Uses of Modern Airships, Kite Balloons, and Free Balloons.
VIII.—April 19th.	L. Bairstow, A.F.Ae.S. (of the National Physical Laboratory): Lt.-Col. Mervyn O'Gorman, C.B., F.Ae.S., in the Chair.	**Stability and Control.** Giving illustrations of stable and unstable types, explaining methods of calculations, etc., and effect of evolutions in the air.
IX.—April 26th.	Lieut. J. S. Irving, R.F.C.; Mr. Hugh Burroughes in the Chair.	**Aero-Engines.** Theory and practice (standard types illustrated).
X.—May 3rd.		**Meteorology and Navigation.** Giving the meteorological conditions which affect aircraft, and explaining the various instruments which are used to facilitate navigation.

A BUSINESS ARRANGEMENT.

Mr. H. W. Wilson, of the East Anglian Engineering Co., Ltd., electrical engineers, motor and dynamo manufacturers, Stowmarket, Suffolk, having resigned his directorship, two fresh directors have been appointed, namely:—Mr. L. Tibbenham, managing director of the Suffolk Iron Works, Ltd., and Mr. D. Stowe, of Messrs. E. Stowe and Co., leather manufacturers.

The works are being reorganised, and are at present very busy on aeroplane parts, but hope in the future to resume the manufacture of their celebrated motors and dynamos.

THE B.-P. MAGAZINE.

Owing to some idiosyncrasy of the post the January number of the Works Magazine of Boulton and Paul, Ltd., of Norwich, arrived only a day or so before the February edition.

The very high standard set in the first numbers is being well maintained, and the general usefulness of the magazine is perceptably increasing. The January number contains a portrait of Captain H. G. ffiske, R.F.A., who, up to the outbreak of war, was manager of the firm's London office. Among a number of interesting articles "A Short History of Artificial Flight" (Part 6), by J. T. Morton, is continued.

The excellent competition section is running in these issues, the competitions being confined solely to practical mechanical problems, the solution of which is bound to assist the mechanical training of the many readers who take part. Most of the competitions refer to methods by which labour can be saved in the workshop in the production of difficult and finicking parts, and it has been found possible to put many of the solutions to practical use. One only regrets that the indubitable value which the answers would have in educating the enemy prevents one from reproducing many of them in this paper.

The illustrations in these issues include pages of "Works Celebrities," and many amusing sketches.

The February issue contains a photograph of Mr. G. E. ffiske, who is responsible for the firm's highly successful aviation work.

A CORRECTION.

In a recent issue of The Aeroplane the name of the London Aircraft Co., Urswick Road, Lower Clapton, N.E., was given as the London Aeroplane Co., and those concerned in the Aircraft Industry are requested to make a mental note of the correct title.

The London Aircraft Company's works, under the management of Mr. S. S. Morch, are now being put into excellent working order for aircraft production. Two assistant works managers have been appointed, one in charge of the wood-working department and one in charge of the metal department.

CONGRATULATIONS.

Blackburn.—On Feb. 20th, at Gledhow Hill Road, Roundhay, Leeds, the wife of Robert Blackburn—a son.

Mr. Robert Blackburn is the founder of the Blackburn Aeroplane and Motor Co., Ltd., and one of the earliest pioneers of British aviation. All will join in congratulating Mr. and Mrs. Blackburn on having a son and heir.

New Patents.

This list is specially compiled for The Aeroplane by Messrs. Rayner and Co., Registered Patent Agents, of 5, Chancery Lane, London, from whom all information relating to Patents, Designs, Trade Marks, etc., can be obtained gratuitously.

Latest Patent Applications.

2371 Blackburn Aeroplane and Motor Co. Controlling mechanism for aerial machines. 17/2/17.

2390. S.V. de Bolotoff. Means to receive strut-ends in aeroplanes, etc. 17/2/17.

2122 A. J. Liversedge. Struts, etc., for aircraft. 12/2/17.

2288. W. M. Savours. Temporary hangars for aircraft. 15/2/17.

Specifications Accepted this Week.

103,918. B. Hinkler. Duplicate controlling means applicable to aeroplanes.

102,261. Curtiss Motor Co. Machines for aerial and nautical navigation.

Specifications Published this Week.

103,400. A. A. Holle, A. W. Judge, and Varioplane Co. Planes and the like for aeroplanes.

Latest Published Abstracts.

15,290. Aeroplanes.—A. A. Holle, Bisham Lodge, and A. W. Judge, "Summerfield," Ashley Road, both in Thames Ditton, Surrey, and Varioplane Co., 34, Gresham Street, London.

The upper surface of the entering edge of an aerofoil is raised, and the surface remains constant, when the trailing part is flexed downwards. In the construction the aerofoil comprises a rigid main structure consisting of a number of spars carried by two planes, a series of flexible ribs carrying the material forming the surface of the plane, and two sets of girders to which the ribs are fixed. The girders are carried on levers pivoted to the plates and the girders on brackets having pins engaging slots in plates. To obtain the desired variation in the camber of the plane, the plates and levers are connected to a lever pivotally carried by the plates and operated from the fuselage To facilitate the control. the parts are arranged so that the negative pressure on the upper front portion is balanced by the pressures on the trailing portion.

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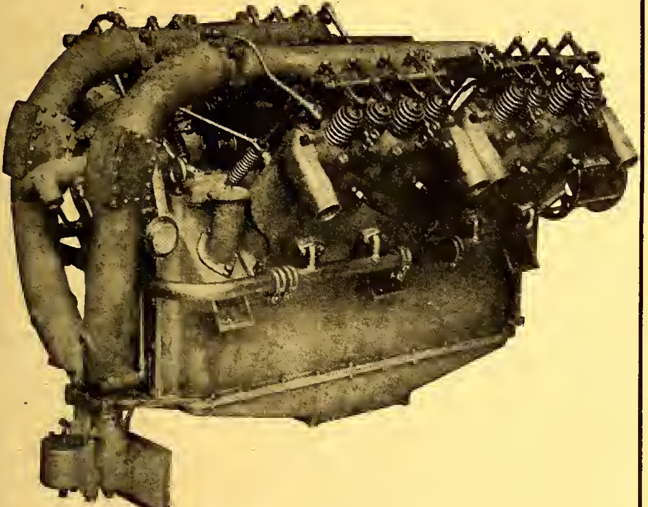

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Blackburn Aero & Motor Co., Ltd , Olympia, Leeds
Bleriot Aeronautics, Brooklands Aerodrome
Boulton & Paul, Ltd., Rose Lane Works, Norwich
British & Colonial Aeroplane Co., Ltd. (The Bristol Co.), Filton, Bristol.
British Caudron Co., Ltd., Broadway, Cricklewood, N.
Canute Airplane Co., Royal Pier Gate, Southampton.
Curtiss Aeroplane Co., L. J. Seely, Clun House, Surrey St., Strand, W.C.
Davidson Aero Co., Ltd., Hammersmith, W.
Eastbourne Aviation Co., Ltd., Eastbourne
Grahame-White Co., Ltd., London Aerodrome
Handley Page, Ltd., 110, Cricklewood Lane, N.W.
London Aircraft Co., Urswick Rd., Lower Clapton, London, N.E.
Mann, Egerton & Co., Aircraft Works, Norwich
Martinsyde, Ltd., Brooklands, Byfleet
National Aircraft Co.,Ltd. 15, Hackney Rd.N.E.
Navarro Aircraft Co., Ltd., Burton-on-Trent
Norman-Thompson Flight Co., Ltd., Bognor
Roe, A. V., & Co., Ltd., Manchester
Sage, F., & Co., Ltd., Peterborough
Saunders, Ltd., East Cowes, I.O.W.
Short Bros., Rochester, Eastchurch and Whitehall House, S.W.
Sopwith Aviation Co., Ltd., Kingston-on-Thames
Standard Aircraft Manufacturing Co., Effingham House, Arundel St., W.
Supermarine Aviation Co., Ltd., Southampton
Vickers, Ltd., Imperial Court, Basil Street, Knightsbridge, S.W.
Waring & Gillow, Ltd., Hammersmith
Wells Aviation Co., Ltd., 10a, Elystan Street, Chelsea
Westland Aircraft Works, Yeovil
White, J. Samuel, & Co., Ltd., East Cowes
Worms Aircraft Construction Co., Twickenham

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The Osborne Aircraft Co., Ltd., Whin Hill, Greenock, Scotland

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British Aeroplane Varnish Co., Ltd., Milburn House, Newcastle-on-Tyne, and 166, Piccadilly
British Cellulose Co., 8, Waterloo Place, S.W.
Cellon, Ltd., Broad St., House, New Broad St.

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Beardmore Aero Eng., Ltd., 112, Great Portland Street
Dudbridge Iron Works, Ltd. (Salmson), 87 Victoria St., London, S.W.
Gnome Engine Co., 47, Victoria St., S.W.
Gordon Watney, Ltd., Messrs., Weybridge
Green Engine Co., Ltd., Twickenham
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Mann, Egerton & Co., Ltd., 177, Cleveland St., London, W.
Mountford, Fredk., Ltd., Fremo Works, Lifford, Birmingham
Rubery, Owen & Co., Ltd., Darlaston
Sankey, J., & Sons, Hadley, Salop
Thompson Bros., Ltd., Bradley, Bilston
Wooler Engineering Co., Ltd., Old Oak Lane, Willesden Junction, N.W.

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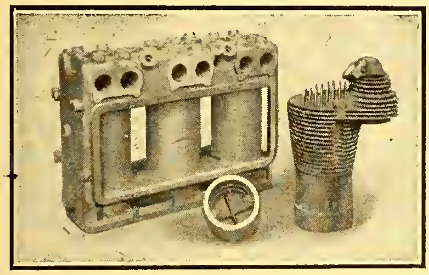

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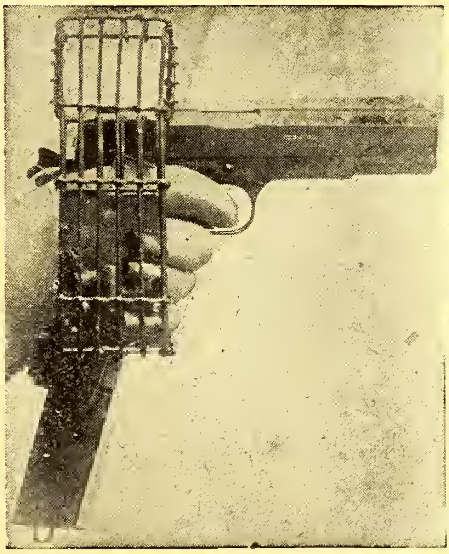

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(*Continued from page* 546.)

McEntegart, Lan. Fus., and to be transfd. to Gen. List; Temp. Sec. Lt. (on prob.) R. M. Burnand, Gen. List, Feb. 9th.

Equipment Officers, 3rd C.—Temp. Sec. Lt. H. E. Hotchin, Gen. List, Jan. 3rd. Temp. Sec. Lt. A. E. S. Story, Gen. List, from a Flying Officer; Sec. Lt. (on prob.) H. C. Perks, Spec. Res., Jan. 25th.

General List.—R.F.C.—Temp. Sec. Lt. G. Douglas relinquishes his commn. on account of ill-health, and is granted hon. rank of Sec. Lt., Feb. 25th.

Memoranda.—To be temp. Sec. Lts. (on prob.) for duty with R.F.C. :—Temp. Sec. Lt. S. M. Pemberton, Dec. 28th, 1916. Cpl. C. Atkey, from R.E., Feb. 8th, 1917.

TERRITORIAL FORCE—Yeomanry.—Sec. Lt. (temp. Lt.) G. Maxwell is secd. for duty with R.F.C., Feb. 4th.

Infantry.—R. Scots.—Sec. Lt. J. W. Hogben is secd. for duty with R.F.C., Feb. 4th.

Oxf. and Bucks L.I.—Sec. Lt. H. J. Pratt is secd. for duty with the R.F.C., Feb. 7th.

* * *

A special Supplement to the "London Gazette," dated Feb. 24th, contained the following :—

War Office, Feb. 24th.

The names of the following have been brought to the notice of the Secretary of State for War for valuable services rendered in connection with the war :—

Austin-Sparks, Temp. Capt. R. H., Spec. List.
Bagnall-Wild, Capt. and Bt. Maj. (temp. Lt.-Col.) R. K., R.E., Res. of Officers.
Beatty, Bt. Maj. (temp. Lt.-Col.) W. D., R.E. and R F.C.
Bishop, Temp. Lt. P., R.F.C.
Blackman, Sec. Lt. S., R.F.C
Bulman, Lt. G. P., R.F.C., Spec. Res.
Campbell, Capt. (temp. Maj.) C. D. M., R.F.C., Spec. Res.
Chaney, Lt. (temp. Maj.) H. E., Lancs. Fus. and R.F.C.
Charlton-Anne, Temp. Capt. C. E. I., Gen. List and R.F.C.
Clark, Capt. A. G., R.F.C.
Collier, Capt. (temp. Lt.-Col.) R. H., R.F.C., Spec. Res.
Dunn, Lt. (temp. Capt.) F., R.F.C., Spec. Res.
Ebben, Lt. (temp. Maj.) H. S., R.F.C., Spec. Res.
Farren, Temp. Capt. W. S., R.F.C.
Gattie, Temp. Sec. Lt. V. R. M., empld. R.F.C.
Goodden, Temp. Maj. F. W., R.F.C.
Green, Temp. Capt. F. M., R.F.C. (T.F.).
Grinsted, Temp. Capt. H., R.F.C.
Hall, Temp. Lt. L. H., R.F.C.
Hackstall-Smith, Temp. Maj. S., R.F.C. (T.F.).
Henderson, Temp. Maj. G. L. P., R.F.C., Spec. Res.
Hiscocks, Temp. Capt. S. W., R.F.C. (T.F.).
Jenkins, Capt. F. C., R.F.C.
Lindsay, Capt. H. E. A., R.F.C.
Livingston, Temp. Lt.-Col. G., Lond. R. and R.F.C.
Low, Capt. A. M., R.F.C.
Lyons, Qrmr. and Hon. Lt. (temp. Capt.) T., R.F.C.
Murphy, Qrmr. and Hon. Lt. (temp. Capt.) A. G., R.F.C.
O'Caffrey, Lt. P. C. M., R.N.A.S.
Perkin, Qrmr. and Hon. Lt. (temp. Capt.) J. E., R.F.C.
Payne, Qrmr. and Hon. Lt. (temp. Capt.) S. J., R.F.C.
Perrin, Sec. Lt. (temp. Capt.) E. S., R.F.C., Spec. Res.
Sadler, Capt. L., R.F.C.
Saunders, Maj. (temp. Lt.-Col.) C., Dorset R. and R.F.C.
Short, Temp. Lt. F. A., R.F.C.
Treatt, Lt. (temp. Capt.) C. C., N. Lanc. R. and R.F.C.
Turner, Temp. Maj. G. B., R.F.C.
Turner, Maj. L. W. F., R.F.C., Spec. Res.
Westendarp, Temp. Capt. O. A., Lond. R. and R.F.C.
Wheatley, Capt. C. W. C., R.F.C.
Whittington, Lt. C. H., R.F.C.
Wilford, Qrmr. and Hon. Lt. (temp. Capt.) J. H., R.F.C.

The names of the following men have been brought to the notice of the Secretary of State for War for valuable services rendered in connection with the war :—

Adair, No. 8548 1st Air Mech. C., R.F.C.; Annan, No. 6499 Flt. Sgt. J. O., R.F.C.

Belcher, No. 6080 1st Air Mech. G. E., R.F.C.; Bere, No. 1159 Flt. Sgt. H., R.F.C.; Bird, No. G./25762 Sgt. J. E., R.F.C.; Bolt, No. 40 Flt. Sgt. (actg. Sgt.-Maj.) E., R.F.C.; Bryant, No. 1440 Actg. Sgt.-Maj. F. H., R.F.C.; Bull, No. 4410 Flt. Sgt. H. R.F.C.

Calnan, No. 3706 Flt. Sgt. F., R.F.C.; Carter, No. 6813 1st Air Mech. D., R.F.C.; Chaplin, No. 29574 Cpl. R. C., R.F.C.; Cockram, No. 1344 Flt. Sgt. S. W., R.F.C.; Condick, No. 2434 Flt. Sgt. S. T., R.F.C.; Cooper, No. 2325 1st Air Mech. A. T., R.F.C.; Cunnington, No. 21269 Cpl. W. H. T., R.F.C.; Cutts, No. 6328 1st Air Mech. H., R.F.C.

Donaldson, No. 1020 Flt. Sgt. R., R.F.C.;

Forargue, No. 19460 1st Air Mech. W., R.F.C.

Glasper, No. 5296 Sgt. W. A., R.F.C.; Griffin, No. 33 Sgt.-Maj. F. C., R.F.C.; Groves, No. 4220 Cpl. F. R., R.F.C.

Ham, No. 18664 Cpl. P. C., R.F.C.; Harding, No. 1408 Sgt. R., R.F.C.; Hester, No. 4542 Sgt. F. W., R.F.C.; Hill, No. 2956 Flt. Sgt. W., R.F.C.; Hiscock, No. 50826 Sgt. E., R.F.C.; Hotchin, No. G./21797 Sgt. H. E., R.F.C.; Houghton, No. 3752 Actg. Sgt.-Maj. A. E., R.F.C.; Howes, No. 1734 Flt. Sgt. R. A., R.F.C.

Johns, No. 13137 Flt. Sgt. A. D., R.F.C.

Karslake, No. 1423 Sgt.-Maj. H., R.F.C.; Knight, No. 6491 Sgt. A. G., R.F.C.; Knights, No. 8337 Actg. Sgt.-Maj. H., R.F.C.

Lamdin, No. 798 Flt. Sgt. (actg. Sgt.-Maj.) F., R.F.C.; Lancaster, No. 1850 Flt. Sgt. E., R.F.C.; Lawson, No. 3965 Actg. Sgt.-Maj. H., R.F.C.; Livermore, Petty Officer R. A., R.N.A.S.; Loughhead, No. 1289 Actg. Sgt.-Maj. W., R.F.C.

Major, No. 4637, Sgt. J., R.F.C.; Mallett, No. 17, Flt. Sgt. (actg. Sgt.-Maj.) E., R.F.C.; Matthews, No. 3940 Actg. Sgt.-Maj. J., R.F.C.; Monteith, No. 4037 1st Air Mech. D. K., R.F.C.; Muston, No. 15102 Actg. Cpl. A. J., R.F.C.

Parker, No. 2622 Sgt. G. E., R.F.C.; Pell, No. 19938 Sgt.-Maj. J., R.F.C.; Percival, No. 5991 1st Air Mech. J. F. S., R.F.C.

Ramsden, No. 1216, Actg. Sgt.-Maj. E., R.F.C.; Rancome, No. 22521 Co. Sgt.-Maj. L. A., Norf. R. and R.C.F.; Rumsey, No. 929 Flt. Sgt. E., R.F.C.

Singleton, No. 14207 1st Air Mech. F., R F.C.; Smith, No. 3081 1st Air Mech. T. W., R.F.C.; Stronach, No. 960 Flt. Sgt. J. M. G., R F.C.

Turner, No. 19987 Actg. Sgt.-Maj. A. W., R.F.C.

Utteridge, No. 2867 Flt. Sgt. E. W., R.F.C.

Viccars, No. 6186 Flt. Sgt. R., R.F.C.; Vint, No. 2976 Flt. Sgt. A. G. H., R.F.C.

Warboys, No. S.R.18 Flt. Sgt. H., R.F.C.; Wildbore, No. 963 Sgt. R., R.F.C.; Williams, No. 591 Sgt. W. J. L., R.F.C.; Winter, No. 343 Sgt.-Maj. F. E., R.F.C.; Woodcock, No. 10342 Cpl. C. J., R.F.C.

* * *

From the "London Gazette" Supplement, Feb. 26th, 1917.

War Office, Feb. 26th.

REGULAR FORCES. — Establishments. — R.F.C. — Flying Officers.—Sec. Lt. (temp. Lt.) G. Maxwell, Yeo., T.F., and to be secd.; Sec. Lt. J. W. Hogben, R. Scots, T.F., and to be secd.; Temp. Sec. Lt. (on prob.) G. Hodgson, attd. North'd Fus., and to be transfd. to Gen. List, Feb. 4th. Lt. (temp. Capt.) F. H. Mardall, Ind. Army, from a Flying Officer (Observer). seny. from July 26th, 1916. Lt. (temp. Capt.) H. P. Sworder, R. W. Surr. R., and to be secd.; Sec. Lt. (on prob.) T. J. Owen, Spec. Res.; Sec. Lt. (on prob.) A. H. Bates, Spec. Res., Feb. 5th. Sec. Lt. M. T. Wright, N. Lan. R., T.F., and to be secd.; Temp. Lt. H. E. O. Ellis, M.C., R.E.; Sec. Lt. H. J. Pratt, Oxf. and Bucks L.I., T.F., and to be secd., Feb. 7th.

Balloon Officers.—Temp. Sec. Lt. J. H. O'Connell, R. W. Surr. R., and to be transfd. to Gen. List, Dec. 16th, 1916, seny. from Aug. 14th, 1916. Temp. Sec. Lt. E. A. Cleaver, E. Yorks R., and to be transfd. to Gen. List, Jan. 2nd, seny. from Sept. 5th, 1916. Sec. Lt. (temp. Lt.) J. R. Bedwell, R.G.A., T.F., Jan. 18th, seny. from Aug. 30th, 1916. Sec. Lt. E. G. N. Grimble, Herts R., T.F., Jan. 18th, seny. from June 11th, 1916. Sec. Lt. F. G. Lake, Herts R., T.F., Jan. 18th, seny. from June 22nd, 1916. Capt. R. L. S. Raffles, R. W. Fus., Spec. Res., reverts from a Balloon Co. Comdr. (graded as a Flt. Comdr.) to a Balloon Officer, Feb. 10th, seny. from Sept. 5th, 1915.

Equipment Officers, 3rd Cl.—Temp. Sec. Lt. A. E. Young, R.A., and to be transfd. to Gen. List, Jan. 4th. Sec. Lt. (temp. Lt.) A. W. Cott, Spec. Res., reverts from an Equipment Officer, 2nd Cl., to the 3rd Cl., and relinquishes his temp. rank, Feb. 8th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Sec. Lt. J. Paradise resigns his commission, Feb. 27th.

TERRITORIAL FORCE.—R.F.C.—Sec. Lt. (temp. Lt.) S. J. Waters is secd. for duty with R.F.C., Jan. 26th.

Yeomanry.—Sec. Lt. E. A. Lloyd is secd. for duty with R.F.C., Feb. 1st.

R.F.A.—Sec. Lt. L. V. Johnsen resigns his commn., Feb. 27th. Sec. Lt. W. E. Dawson is secd. for duty with R.F.C., Feb. 7th.

Infantry.—Oxf. and Bucks L.I.—Lt. H. A. Wilsdon is now secd for duty with R.F.C., Feb. 13th.

Yorks L.I.—Sec. Lt. N. C. Denison is secd. for duty with R.F.C., Feb. 4th.

London R.—Sec. Lt. E. S. C. Brooks is secd. for duty with R.F.C., Jan. 29th.

FROM THE COURT CIRCULAR

Buckingham Palace, Feb. 21st.

The following officer had the honour of being received by His Majesty, when the King invested him with the Insignia of the Division of the Order into which he has been admitted :—

The Most Honourable Order of the Bath.

Civil Division.—Companion.—Rear-Admiral Charles Vaughan-Lee.

The following gentleman was introduced into His Majesty's presence, when the King conferred upon him the Honour of Knighthood :—

William Weir.

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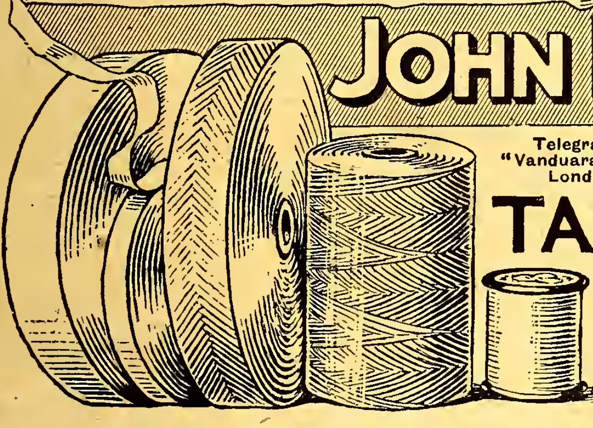

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His Majesty then conferred decorations as follows:—

THE MILITARY CROSS.

Second Lieut. Theodore West, R.F.C.
Second Lieut. Geoffrey Wood, R.F.C.

* * *

BUCKINGHAM PALACE, Feb. 24th.

The following officers had the honour of being received by the King, when His Majesty invested them with the Insignia of Companions of the Order into which they have been admitted:—

THE DISTINGUISHED SERVICE ORDER.

Flight Commander Stanley Goble, R.N.A.S.
Lieut. Norman Brearley, The King's (Liverpool Regt.), attached R.F.C.

The King then conferred decorations as follows:—

THE MILITARY CROSS.

Major Ewart Horsfall, R.F.C.
Capt. Guy Reid, Seaforth Highlanders and R.F.C.
Capt. Clark Sherren, R.F.C.
Lieut. Norman Brearley, The King's (Liverpool Regt.), attached R.F.C.

NAVAL.

The following appointments have been made in the Royal Naval Air Service:—

FEB. 20th.—Lt.—R. B. Ward, promoted to rank of Lt.-Comdr., seny. Feb. 19th.

Lt. (R.N.V.R.) (temp.).—J. M. Fraser, promoted to rank of Lt.-Comdr. (temp.), seny. Feb. 17th.

Mr. J. N. Gallwey, entered as Proby. Flt. Officer (temp.), seny. Feb. 25th, and apptd. to "President," addl., for R.N.A.S.

FEB. 23rd.—Proby. Flt. Sub-Lt. (temp.).—H. J. R. Maitland, granted a temp. commission as Sub-Lieut. (R.N.V.R.), seny. Feb. 21st.

Mr. V. H. Littleboy and Sub-Lt. (R.N.V.R., temp.) C. E. Bramhall, have been entered as Proby. Flt. Officers (temp.), seny. respectively Jan. 7th and Feb. 21st.

THE CASUALTY LIST.

Reported Feb. 21st.

KILLED.—Campbell, J. A., Air Mech., 2nd Grade, F.18244; Gill, V. J. A., Air Mech., 1st Grade, F.13877.
DIED OF WOUNDS.—Cowin, G. L., Air Mech., 1st Grade, F.5325.
SEVERELY WOUNDED.—Anstead, E., Air Mech., 1st Grade, F.6265.
Booker, A. M., Air Mech., 2nd Grade, F.21600.
Carney, R. H., Air Mech., 1st Grade, M.16452 (Ch.)
Chelmick, A. H., Air Mech., 1st Grade, F.14151.
Edy, J., Air Mech., 2nd Grade, F.21602.
Elleman, E. J., Air Mech., 2nd Grade, F.10673.
Harding, R. O., Air Mech. 1st Grade, F.6975.
Martin, E. D. F., Air Mech., 2nd Grade, F.13997.
Newman, G. A., Air Mech., 1st Grade, F.13255.
Nicholas, H., Air Mech., 2nd Grade, F.11918.
Parsons, T. W., Air Mech., 1st Grade, F.13881.
Pope, T. V., Air Mech., 1st Grade, F.5494.
Taylor, F. C., Ldg. Mech., F.8119.
Watson, A., Air Mech., 2nd Grade, F.8357.

PERSONAL NOTICE.

MARRIAGE.

NEWBERRY—COWPER.—On the 20th inst., at All Saints', Eastbourne, Flight Lieut. J. D. Newberry, R.N., second son of Mr. and Mrs. Charles Newberry, of Prynnsberg, Clocolan, South Africa, was married to Mary Lethbridge (Mollie), second daughter of Mr. and Mrs. H. P. Cowper, late of The Brigalows, N.S.W., Australia.

MILITARY.

G.H.Q. COMMUNIQUÉ.

FEB. 26th, 9.25 p.m.—In the course of air fighting yesterday, one German aeroplane was destroyed and one other hostile machine driven down damaged.

WAR OFFICE COMMUNIQUÉS.

The General Officer Commanding the British Forces in Mesopotamia reports:—

FEB. 25th.—During the past few days two enemy aeroplanes have been shot down.

The General Officer Commanding the British Forces in Mesopotamia reports:—

FEB. 26th.—Throughout the fighting our aeroplane squadrons have co-operated with invaluable results, freely using bombs and machine-guns from minimum altitudes.

THE CASUALTY LIST.

Reported Feb. 21st.

KILLED.—Green, Lt. T. S., R.F.C.
PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED.—Holtom, Sec. Lt. J. N., R.F.C.
PREVIOUSLY REPORTED MISSING, BELIEVED PRISONER, NOW REPORTED PRISONER IN GERMAN HANDS.—Pocock, Sec. Lt. A. D., R.F.C.
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER IN GERMAN HANDS.—Insoll, Sec. Lt. F. N., R.F.C.

Reported Feb. 22nd.

KILLED.—De Ross, Sec. Lt. A. G. S., R.F.C.
Myers, Sec. Lt. F. M., M.C., Suffolk Regt., attd. R.F.C.
Nisbet, Sec. Lt. F. W., Yeomanry and R.F.C.
Young, Sec. Lt. F. C., R.F.C.
WOUNDED.—Bailey, Capt. G. C., D.S.O., R.F.C.
Goodwin, Lt. S. E., Liverpool Regt. and R.F.C.
Jourdan, Sec. Lt. W. T., R.F.C.
Pearson, Sec. Lt. W. J., R.A.M.C., attd. R.F.C.
Taylor, Sec. Lt. F. J., R.F.C.
PREVIOUSLY REPORTED MISSING, NOW REPORTED MISSING, BELIEVED KILLED.—Matthews, Sec. Lt. H., R.F.C.
White, Lt. S. J. M., Norfolk Regt. and R.F.C.
MISSING.—Bennett, Sec. Lt. C. D., R.F.C.
Black, Maj. M. A., Dragoon Gds., attd. R.F.C.
Croft, Sec. Lt. H. A., R.F.C.
Stopher, Sec. Lt. A. C., R. Welsh Fus., attd. R.F.C.

Reported Feb. 23rd.

KILLED.—Mulock, Lt. H. C., R.F.C.
WOUNDED.—Rathkens, Sec. Lt. H. E., R.F.C.
Wainwright, Lt. R. B., Lancers, attd. R.F.C.
MISSING.—Hamilton, Sec. Lt. E., R.F.C.
Scott, Capt. C. L. M., N. Staffs R., attd. R.F.C.
Shepherd, Capt. J. M. E., R.F.C.

Reported Feb. 24th.

KILLED.—Townsend, Sec. Lt. A. E., Durham L.I. and R.F.C.
WOUNDED.—Jones, Capt. H. W. G., Welsh R. and R.F.C.
MISSING.—March, Lt. C. H., R.F.A. and R.F.C.

Reported Feb. 26th.

KILLED.—Carse, Sec. Lt. W. K., R.F.C.
Simpson, Capt. F. W. H., R.G.A. and R.F.C.
PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED.—Bolitho, Sec. Lt. G. R., Devon R., attd. R.F.C.
Black, Major M. A., Dragoon Gds. and R.F.C.
Russell, Sec. Lt. F. G., R.F.A., attd. R.F.C.
MISSING.—Munn, Sec. Lt. L. V., Leicester R., attd. R.F.C.
PREVIOUSLY REPORTED MISSING, NOW REPORTED DIED OF WOUNDS AS PRISONERS IN GERMAN HANDS.—Cameron, Sec. Lt. J. G., Cameron Highrs., attd. R.F.C.
Echlin, Sec. Lt. F. St. J. F. N., R. Fus., attd. R.F.C.
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER IN BULGARIAN HANDS.—Smith, Lt. S., R.F.C.

Reported Feb. 27th.

DIED.—R.F.C.—Evans, 51646 3rd Cl. Air Mech. W. H. (Leytonstone, N.E.).
WOUNDED.—R.F.C.—Robson, 36041 2nd Cl. Air Mech. J. G. (Hammersmith, W.).

PERSONAL NOTICES

DEATHS.

BLACK.—Major Maurice Adam Black, Dragoon Guards and R.F.C. (reported missing, believed killed), was born in August, 1876, and entered the Dragoon Guards from the Militia in December, 1899. He had his majority in September, 1914, and was a flight commander R.F.C. in August last year. Major Black saw service in the Boer War (1900-2), and had the Queen's and the King's medals with five bars. He was one of the best polo players in his regiment, for which he took part in the inter-regimental tournaments, and he was handicapped at six points on the Hurlingham list.

* * *

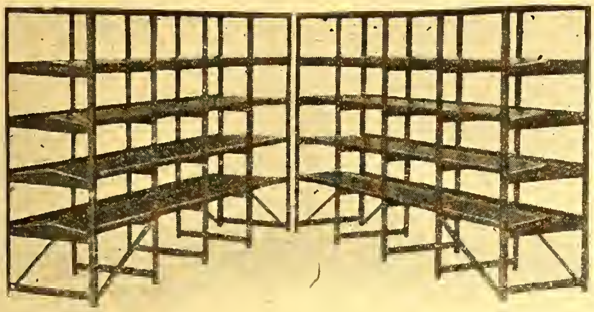
COLLER.—Lieut. Bernard Tarrant Coller, Norfolk Regt., attd. R.F.C., previously reported missing, but now unofficially reported killed while flying over the enemy lines on Sept. 26th, 1916, aged 22 years, was the eldest son of Mr. and Mrs. Charles Tarrant Coller, of Judges' Walk, Norwich. He was educated at St. Cyprian's, Eastbourne, Bradfield College, and University College, Oxford. He was in the O.T.C. at Bradfield and Oxford, and obtained a commission in the Norfolk Regt. in October, 1914. He joined the R.F.C. in November, 1915, and in the following May was sent to the front.

Writing of him and his observer, his squadron commander says: "He and Lieut. Scaife (who is officially reported 'missing') used nearly always to work together, and a more gallant pair were to be found nowhere. They have played a magnificent part in the war, and their fine work has been the subject of much praise from all sides."

His flight commander writes:—"He was a most gallant officer, his name having gone in both for promotion and honours, which he undoubtedly would have got and deserved."

* * *

FRY.—An inquest was held on Feb. 22nd on the body of Sec. Lt. John L. Fry, 19, a Canadian, whose home is at Toronto. He was making a straight glide to land with the engine shut off, when, seeing that he would overshoot the landing ground, he turned sharply to the left. He continued to descend, and at 150 ft. to 200 ft. off the ground made another sharp left turn. This



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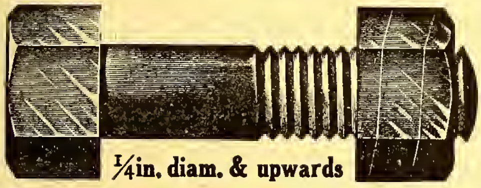

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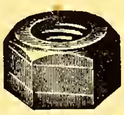

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brought him into or across the wind in such a way that the machine nose-dived, and at that height, there being no time for recovery, it crashed into the ground. The jury found that the occurrence was accidental.

* * *

FRY.—On Feb. 24th an inquest was held at Cirencester on the body of Sec. Lieut. Horace Charles Fry, West Kent Regt., attd. R.F.C., whose home is at Aldine House, Budgett Street, Belvidere, Kent, and who died in the Cirencester Hospital on Friday as the result of a flying accident. Mr. Fry, who was 22 years of age, was observer, and Lieut. Finney was pilot. When six miles from Cirencester, owing to the fog they determined to land in order to ascertain their whereabouts, and a field was selected for the purpose. As the machine was descending, Mr. R. V. Large, the tenant of the farm, saw it suddenly nose-dive and fall to the earth. Both officers were badly injured, Mr. Fry being conveyed to Cirencester Hospital, where he died from injuries to the head. Mr. Finney was taken to Malmesbury Hospital, where he is suffering from a fractured thigh. Expert witnesses gave it as their opinion that the machine "stalled" as the result of too sharp a turn in the course of the descent. Capt. Halland stated that he thoroughly tested the machine before it left, and that the engine was in perfect order. The jury returned a verdict that death was due to an accident caused by too sharp a turn, and that there was no defect in the engine.

* * *

GRIEVES.—An inquest was held on Sec. Lieut. James Grieves, aged 22, of Liverpool, on Feb. 22nd. Mr. Grieves was killed while practising landing. During his fourth flight part of the landing carriage of his machine was seen to fly off. Instead of falling clear, it caught in the blades of the propeller. As the engine was running, the propeller was smashed. One fragment severed the tail-boom, and the machine, which was then nearly 1,000 ft. up, fell to earth in a spinning nose-dive.

Mr. Grieves was killed instantly. A verdict of accidental death was returned.

The accident is an example of the danger of landing and then starting off again without examining the under-carriage for possible damage. On various occasions before the war attention was drawn to this custom, which had accounted for several deaths in the early days of flying. It does not, in fact, take long to look over an under-carriage if the business is done as a matter of routine.

* * *

MYERS.—Sec. Lieut. Francis Michael Myers, M.C., Suffolk Regt., attached R.F.C. (killed in action), received his commission in February of last year.

His award of the Military Cross was gazetted in November "for conspicuous gallantry in action. He carried out a daring raid with great courage and skill. Previously he did some valuable patrol work.

* * *

NISBET.—Sec. Lieut. F. W. Nisbet, R.F.C., killed in action, was 19 years of age. Enlisting in the Yorkshire Dragoons in August, 1914, he was granted a commission in the same regiment in June, 1915. He transferred to the R.F.C. last September, and was gazetted a flying officer in December. His elder brother, Lieut. D. G. Nisbet, was killed last year. They were the sons of Mr. William Nisbet, of 8, Palace Road, Kingston-on-Thames.

* * *

PRESTON.—Lieut. Thomas Frederick Preston, Yeomanry, attached R.F.C., third son of the late Sir Henry Jacob Preston, Bt., of Beeston Hall, Norfolk, and of Lady Preston, Barton Hall, Norwich, was born in 1889, and educated at Charterhouse, and in 1907 he entered the Norwich Union Insurance Office. Four years later he went to Egypt, where he worked first in the National Bank of Egypt, and then in the Financial Department of the Egyptian Civil Service at Cairo. In 1913 he returned to England to take up an appointment with Messrs. J. J. Colman, of Norwich, and had been only a few months at Carron Works when the war broke out. Mr. Preston went with the Yeomanry to Suvla Bay, where after a few months he contracted enteric and was invalided home.

In 1916 he joined the R.F.C., and proceeded to the front on Jan. 2nd last. He was reported missing on Jan. 24th. His machine appears to have been brought down by German anti-aircraft guns while he was taking observations over the enemy's lines. Later he was reported killed with his observer.

* * *

SEGRAVE.—Lieut. W. H. Segrave, R.F.C., was accidentally killed on Feb. 12th, while flying a biplane on service. He was the second son of Major O'Neal Segrave, D.S.O., and Mrs. Segrave.

* * *

SIMPSON.—Capt. F. W. H. Simpson, R.G.A., attd. R.F.C., who was killed in action on Feb. 16th, was the son of Professor and Mrs. W. J. Simpson, of 31, York Terrace, Regent's Park, and was 25 years of age. Educated at Winton House, Winchester, Cheltenham College, and the Royal Military Academy, Woolwich, he obtained his commission in the Royal Artillery in 1910. Before the war he had passed the Army examination in Russian. In Malta when the war broke out, he came to England with his battery, and proceeded later to France.

Eighteen months ago he joined the R.F.C. as an observer, and was mentioned in dispatches; later he became a pilot, and ultimately the senior flight commander of his squadron. Endowed with an exceptional combination of talents, artistic and scientific, he was not only a brilliant young soldier devoted to his profession and a good organiser, but he was a splendid draughtsman and caricaturist, and possessed an inventive faculty which, had he lived, was bound to be of great service.

In 1912 he invented for the Admiralty an automatic water-tight ventilator suitable for the ventilation of warships in rough weather, and he had just invented an improved method of communication between infantry attacking and the aeroplanes that have to keep in touch with them. The General Officer commanding R.F.C. had expressed his warm thanks for what he termed "this highly ingenious device." His C.O. writes that "he always set a splendid example to others by his courage and hard work."

* * *

TOWNSEND.—Lieut. A. Eric Townsend, Durham L.I. and R.F.C., second and only remaining son of Dr. and Mrs. Townsend, of Normanby, was killed on Feb. 15th, aged 21. He was educated at Haileybury, and on leaving school went to the Cargo Fleet Iron Co., Ltd. He joined the East Riding Yeomanry shortly after the outbreak of war, and received a commission in the Durham L.I. in November, 1914. Six months later he was invalided out of the Service owing to acute attacks of rheumatism. During the following 12 months he was actively employed at Cargo Fleet Iron Works, and eventually applied for, and was again given, a commission in his old regiment. A month later he was transferred to the R.F.C., and left England for the front on January 17th last.

* * *

WILSON.—Sec. Lieut. Gordon Ivor Wilson, Yeomanry, attd. R.F.C., whose death was announced last week, was the only son of Mr. and Mrs. Alex. M. Wilson, late of East Keal Manor, Spilsby, now of Shovell, near Bridgwater, and the grandson of the late George Wilson, of Banner Cross, Sheffield, and of the late Charles Henry Simpson, of Moor Top House, Ackworth. He was educated at Arden House, Henley-in-Arden, and at Repton, where he was at The Priory. He had his commission in the Yeomanry in March, 1915, and was attached to the R.F.C. in September, 1916. He had just qualified for his "wings."

* * *

YOUNG.—Sec. Lieut. Francis Chisholm Young, R.F.C., killed while flying at the front on Feb. 14th, was the eldest son of Professor W. H. Young, F.R.S., Professor in Higher Mathematical Analysis at the University of Liverpool, and of his wife, Grace Chisholm Young, Ph.D. (Göttingen), of Lausanne, Switzerland. Born in 1897, he was educated first in Göttingen, where his mother, an Englishwoman and Cambridge Wrangler, who in 1895 had been the first woman ever allowed by the Prussian authorities to take a degree, was then residing.

Subsequently, on the removal of the family to Geneva, he was a pupil at the College de Genève, where he had an exceptionally brilliant record, passing out as head boy when two years younger than the rest of his class. After matriculating at the University of Geneva, he migrated early in 1914 to the University of Lausanne in order to study mechanical engineering; but in the autumn of 1915 came to England to offer himself for the Army. He was sent back by the War Office to complete his University course at Lausanne, and in July, 1916, returned to England and obtained a commission in the R.F.C., being given his "wings" in October. For the last three months he had been actively engaged at the front.

ENGAGEMENTS.

BELL—SOARES.—The engagement is announced of Capt. W. D. M. Bell, M.C., R.F.C., youngest son of the late Mr. Robert Bell, of Clifton Hall, Mid Lothian, to Katie, only child of Sir Ernest and Lady Soares, of 36, Princes Gate, S.W.

* * *

ERSKINE—HIGGINS. — The marriage of Ralph Erskine, Lieut., R.F.C., and Jane Lennox, only daughter of Mr. and Mrs. William Higgins, Glenafton, Wimbledon, will take place at St. Columba's Church, Pont Street, on March 9th, at 2.30 p.m.

MARRIAGES.

GRIFFIN—OXENHAM. — On Feb. 20th, at St. Michael's, Chester Square, London, by the Bishop of Kensington, Lieut. C. S. J. Griffin, the Gordon Highlanders and R.F.C., only son of Lieut.-Col. C. P. G. Griffin, D.S.O., and Mrs. Griffin, Berridon Hall, Bradworthy, Devon, was married to Sybil K. E. Oxenham, only daughter of the late Samuel Oxenham, Devonshire Place, Eastbourne, and Mrs. Glynn, wife of Col. T. G. P. Glynn, C.M.G., The Grenfalls, Cheltenham.

* * *

HIGGINBOTHAM—CATTO.—On Feb. 22nd, 1917, at Christ Church, Willaston, by the Rev. Walsham Postance, Vicar, Lieut.

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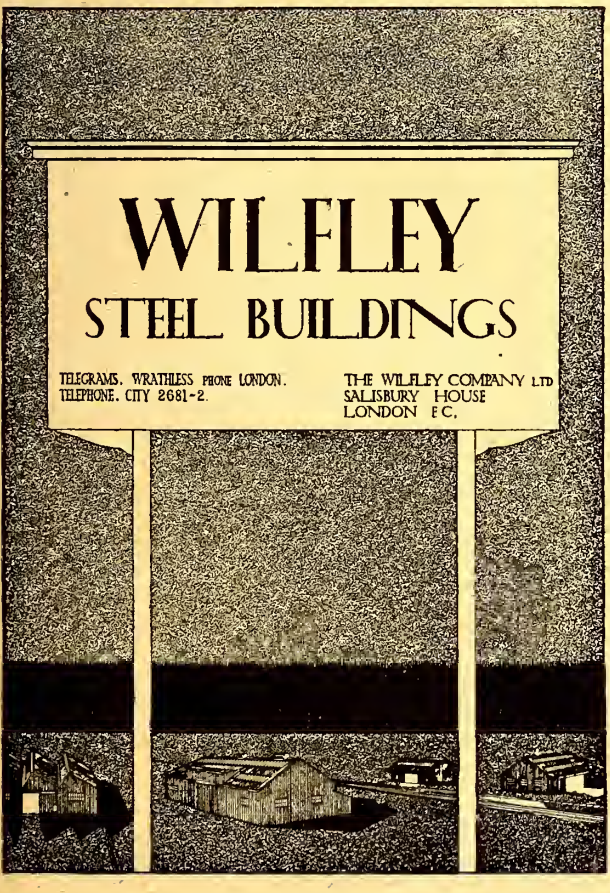

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H. C. Higginbotham, Argyll and Sutherland Highlanders, attd. R.F.C., eldest son of R. K. Higginbotham, Braehead House, Bearsden, was married to Christian, elder daughter of J. K. Catto, J.P., Willaston House, near Chester.

* * *

SOMERSET-LEEKE—HELDER.—On the 19th inst., at St. John's, Hensingham, Cumberland, Capt. A. F. Somerset-Leeke, R.F.C., son of Lieut.-Col. A. F. Somerset-Leeke, R.E., was married to Winifred Rose, daughter of L. T. Helder, of Whitehaven.

Births.

ROBERTSON-AIKMAN.—On Feb. 16th, at Granada House, Granada Road, Southsea, to the wife of Mr. D. Robertson-Aikman, Lieut., R.F.C.—a daughter.

* * *

SPAIN.—On Feb. 21st, at Oxford, to the wife of Leslie O. Spain, R.F.C.—a daughter.

It was reported from Paris on Feb. 26th that a French correspondent takes the following incident from official documents placed at his disposal:—

A couple of British aviators, after a reconnaissance fifty miles behind the enemy lines on the Somme, were on the way back when they spotted a German monoplane ahead. They gave chase, exchanging rapid shots, and eventually the adversary, seeing that he had no chance of getting away, made a hurried spiral descent and landed.

The British pilot and his companion hovered overhead for a few minutes lest the Hun should try to make off. But the monoplane remained motionless, and the aviator did not get out of the machine.

As the country was desolate and deserted, the Englishmen decided to go down to investigate. Approaching the German, they shouted, "Hands up!" There was no reply. He was dead. A machine-gun bullet had cut an artery and left him just enough strength to reach the ground. His machine was intact, so, after removing the body, one of the pilots got into it and, with his fellow-officer piloting the other machine, returned home.

Everything went well until the German aeroplane was seen over our lines; but it fortunately passed safely through the shrapnel which greeted it, and landed without injury.

[The tale is a bit steep, but is probably founded on fact. One merely wonders why the two machines did not fly back so close together that the Archies on both sides would be afraid to fire at them.—Ed.]

FRANCE.

Official Communiqués.

Feb. 22nd.—Army of the Orient.—Our aviators have been very active, have fought several successful engagements, and have dropped bombs successfully on enemy columns near Seres and on Melkuk.

Feb. 23rd.—A German aeroplane was brought down by our anti-aircraft guns south of Cernay.

Feb. 24th.—During the night one of our dirigibles bombarded the factories in full working order in the region of Briey, and returned without mishap to its landing place. Four hundred kilogrammes (nearly half a ton) of bombs were dropped by our aeroplanes on the German bivouacs in the Forest of Spincourt.

Feb. 25th.—One of our air squadrons effectively bombarded the railway stations of Grandpré and Romagne-sous-Montfaucon.

Feb. 26th.—Yesterday our pilots brought down three German aeroplanes. One of these machines fell in our lines towards Mersy (? Merly), in the region of Reims, the second south of Pinon (Aisne), and the third south-east of Altkirch.

Our bombarding squadrons dropped numerous bombs upon bivouacs and a munitions depot near Spincourt, where many explosions were heard, as well as upon the terrain and the aircraft sheds at Buzency (?Buzancy, east of Vouziers), the railway at Ars-sur-Moselle (south-west of Metz), and the stations of Bousseweiller and Wölflingen, region of Weissenburg.

* * *

It was reported from Paris on Feb. 21st that "Quartermaster Hauss, one of the latest crack French aviators, who recently performed the rare exploit of bringing down four enemy machines in six days, has just paid for his valour with his life. In an air fight in which this aviator was engaged three days ago his machine suddenly collapsed in flames and was dashed to earth. Hauss was 26 years old."

* * *

It was reported from Paris on Feb. 22nd that Sergt. Aviator Edouard Lumière has been killed in an aeroplane accident in the Haute Saone. He was one of the brothers who invented the cinematograph.

GERMANY.

Official Communiqués.

Feb. 25th.—During the night of the 23rd-24th a French airship was brought down in flames in the wood east of Saaralben by our anti-aircraft guns.

Feb. 26th.—Yesterday, in numerous aerial engagements, the enemy lost eight aeroplanes, two of which belonged to an air squadron which dropped bombs unsuccessfully in the Saar region.

* * *

A message from Geneva dated Feb. 20th states that it is reported from Romanshorn that a number of expert workmen employed in the Zeppelin factory at Friedrichshafen have been ordered to return to their regiments.

Two new airships are nearly finished, but cannot be completed without their aid. This order would seem to confirm the stories of the failure of the Zeppelins even in the German mind.

RUSSIA.

Official Communiqués.

Feb. 20th.—In the region of Smorgon (south-east of Vilna), on Feb. 18th and 19th, our pilots had a number of successful aerial engagements with the enemy. One of our aeroplanes, piloted by Sub-Lieut. Tamson, had a desperate combat with two enemy machines and forced both to return to their position.

Feb. 23rd.—In the region of Shelvoff (24 miles west of Lutsk) a hostile machine attacked one of our aeroplanes, which was directed by Pilot Sub-Lt. Svatogoroff. The latter turned his machine round with a sharp movement and fired upon his assailant at close quarters. The enemy machine planed and finally fell into the opposing lines north-west of Shelvoff.

Feb. 25th.—In the region south-east of Baranovitchi an enemy aeroplane, which was subjected to our rifle and machine-gun fire, turned over several times in the air and fell into the enemy's lines.

AUSTRIA.

It is reported from Rome that an Italian airship bombarded the naval dockyard of Pola on Feb. 25th, dropping over a ton of explosives on the military works. The airship was subjected to a furious artillery fire, but returned to her base undamaged.

ITALY.

Official Communiqués.

Feb. 21st.—One of our airships last night successfully bombarded some enemy billeting areas north-east of Comeno (Carso), causing the outbreak of big fires. In spite of heavy fire from hostile anti-aircraft batteries she returned safely.

Feb. 23rd.—Last night one of our airships, by a clever manœuvre, suddenly reached the enemy aviation ground at Prosecco, and dropped one ton of high explosive with visible success. She returned safely.

Feb. 25th.—The weather was favourable to aerial activity. Our aviators, supported by artillery, put to flight the hostile aeroplanes.

Feb. 26th.—Our anti-aircraft batteries hit an enemy aeroplane that fell down near Duino (on the coast south-east of Monfalcone). Last night two of our airships successfully bombarded the railway station of Rifemberga, in the Branizza Valley (Frigido), and the aviation ground at Processo, north of Trieste. On the objective 2½ tons of high explosives were dropped with effective result. In spite of the heavy fire from hostile anti-aircraft batteries and of a violent unfavourable wind, the airships returned safely to their bases.

GREECE.

It was reported from Athens on Feb. 18th that great artillery and aerial activity is reported from Salonica as having occurred on the 17th on the British front. The same afternoon a German aeroplane flew over Salonica, but disappeared towards the north on being bombarded by the Allied batteries and ships.

TURKEY.

Official Communiqué.

Feb. 20th.—On the Sinai front, on Feb. 5th (? 15th), an enemy aeroplane was compelled to land behind our positions. The enemy machine was burnt, but its pilot was made prisoner.

BULGARIA.

Official Communiqué.

Feb. 21st.—An enemy aeroplane unsuccessfully dropped bombs on the station of Oktchilar (Greco-Bulgarian frontier, on Salonika-Constantinople railway).

BELGIUM.

Official Communiqué.

Feb. 20th.—A German aeroplane has been brought down South of Woesten. Belgian aviators have executed numerous flights in the course of last week. More than twenty fights have been fought over the enemy's lines. The collaboration of the Belgian aviators in the regulating of long-range firing on the German positions has assisted in establishing the good results obtained.

HOLLAND.

It was reported from Amsterdam on Feb. 24th that the Dutch Minister in Berlin has lodged a serious protest with the German Government against the violation of Dutch territory by Zeppelin "17." This airship had been fired on at various places.—[Which seems as if it must have given the crew a sufficiently good pretext for protest also.—Ed.]

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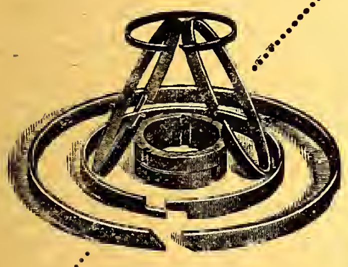

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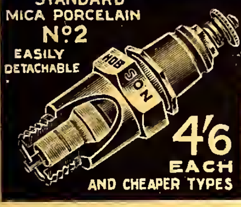

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TECHNICAL INSTRUCTIONS.

[The following document, which purports to be a copy of official instructions issued by some Department somewhere or other, appears to be of technical interest. The editor takes no responsibility for its genuineness, or any of its other characteristics. It may perhaps be only the product of a nightmare caused by a surfeit of instructions of a similar but more practicable nature.]

As a result of Post Mortem Examinations recently held on Several Defunct Machines that had shown signs of Internal Complications, it was discovered that a new and virulent disease, viz., "Gluenottis Opperrhitis," had made its appearance, and in order to stamp out the Epidemic in its infancy the following FIRST AID Hints have been issued :—

Quote A.I./Glunatic/O.K. Telegrams : "LIMPIT," London.
From Aeronautical Confection Department,
Gluten House,
Croid Road,
LONDON.

To Examiner in Charge,
Messrs. McClagg, Ltd.
Stickett Works,
SOMEWHERE.

SIR,—I enclose an important Circular Letter on Glueing Operations, and beg to inform you that a Report on the subject is to be sent to Headquarters on the first of each month.

I wish especially to draw your attention to the fact that these Reports must be made out in Batches of Fifty on form No. 8437/S.G.O. and in Different Coloured Inks, which can be had on application to the R.A.F. on Form No. 5942/Rainbow/2Z.

In order to assist Examiners to distinguish the back of a Postage Stamp from a Fly Cemetery with a moderate degree of certainty, the following excerpts from the Aircraft Committee's Report on the Adhesive Investigations of the Technical Laboratory have been issued, and while no Hard or Fast mode of procedure can be laid down for their guidance, it is considered that a thoroughly Practical and Theoretical knowledge of Glue and its Uses is not absolutely essential in distinguishing the difference between a Petrol Tank and a Fibre Washer, and however true the Maxim that "A little knowledge is dangerous," in this instance it is presumed that an elementary knowledge of Glueish History will not exceed the Limit of Allowances either + or —; therefore it is confidently expected that with the AID of the valuable and confidential information now made available for Examiners' use, they will individually and collectively do all in their power to raise the Standard of Glueing Operations to that high pinnacle of excellence consonant with maintaining supremacy in Aviation.

GENEALOGY.

Glue is Glue nowadays, especially the Approved Brands, and even after making out the order in Triplicate one doesn't get much for a penny.

The two best known species are "Gluenetticus Hardicuss" (best mixed) and "Gluenetticus Damposis Liquidium" (prize strain). The former is guaranteed to grow a record crop of Fungi if left in the pot to germinate for a few days, while the latter is very popular from the fact that someone has invariably trodden on the only tube one possessed. when a few drops were required in an emergency to mend a golf club.

It is a homogeneous amalgam of heterogeneous parentage, and in appearance it resembles most brands of Toffee de Luxe, from which it can be easily distinguished by anyone having a delicate sense of taste, although at the present time, owing to the high price of sugar and prevalence of adulteration, this method must not be accepted as infallible, and Examiners must satisfy themselves on this point by any other conclusive test they can think of.

This gelatinous substance is culled principally from the Curvinilear Corrugated Protuberances and Cloven Hoof of the Domesticated Creature of the Bovine Race, and in colour varies from Sandy to a rich Auburn; Wherefore, the true artistic eye will readily recognise the correct shade and tone which yields the O.K. Aroma, and produces under ideal conditions the acme of Tenacity for a given operation.

BOUQUET.

Like the taste for good whisky, which has to be systematically acquired, Examiners will require a considerable amount of experience (only in connection with Glue, of course) and methodical training of the Olfactory Senses before they acquire that true Connoisseur's unerring instinct absolutely indispensable in this branch of Gluenotics, as some brands, especially the unapproved ones, have a very Rich Aroma with a correspondingly poor Tenacity, while others, whose Effluent Emanations are somewhat feeble in penetrating power, have a grasping tendency equalled only by an amalgam of the average Landlord and the ubiquitous Gentleman who is so anxious to accommodate you with £5 to £5,000 on an un-Release Note of hand only.

PREPARATION FOR USE.

There are plenty of cheap cookery books available with numerous recipes for cooking Glue, and it is left to the individual Examiner to adopt any particular "Scheme" which he may think best, which must be forwarded to Headquarters for Consideration and Approval. Each scheme must have a distinguishing Letter, and Examiners are reminded that as there are only Twenty-Six Letters in the Alphabet should they find it necessary to exceed this number they must get special permission (see Form No. 8037/Scheme/S.G.O.) to operate further with Roman Numerals, and if they should exhaust these also before the War is over, there is always the Greek Alphabet and Chemical Symbols to fall back upon. The Chinese Alphabet is further recommended as possessing over 4,000 radicals.

Attention is drawn to the fact that in the National Physical Laboratory's research and experiments in Boiletics with a 3-ft., 4-ft., and 7-ft. Stock Pot and Swirling Arm, it was conclusively proved that providing the Glue used was of an Approved Brand, the best results were obtained when the pieces of Glue were rectangular in shape, uniform in size (2.7854 × 1.9542 gave the best results), and any one side not more than .209 of a degree off the square.

It was further discovered that if the letters AID were stamped on the right-hand top corner, and the symbols WΛD on the left-hand narrow edge, the Tenacity increased from 19.7 per cent. to 21.03 per cent. relatively to the degree of legibility of the stampings.

APPLICATION.

It is absolutely essential to note whether the Glue is Properly or Improperly applied. For instance, Cake or Candy Glue must never be applied in a fine powder and then moistened with Saliva, as Tobacco Juice is not a suitable liquefying medium for Aero Work, and it is also advisable that Glueists should, if possible, be total abstainers, as Alcoholic Fumes have a tendency to soften all but the most hopeless brands of Glue.

If, however, the Adhesive Conglomeration be prepared from an Approved Brand, is of the proper consistency and correct tone, and emits aromatic emanations which do not unduly offend the olfactory senses, Examiners should allow a certain amount of Individuality in the application thereof. And if, for example, an expert Glueist should display a flash of Genius by applying the Cohesive substance with the Handle of the Glue Brush instead of the Bristles, Examiners are recommended not to raise any objection to this method of Sloberation, as they might discourage any further experimental tendencies in the realm of Seccotineisation and thereby miss the chance of obtaining valuable hints indispensable in raising the Standard of Glueing Operations.

ADHESIVE TEST.

To obtain a perfect joint, Examiners must insist that the Coagulatory Medium be spread on the surfaces that will be in direct juxtaposition to each other, because possibly ere this they will have discovered that average glue, whether of an Approved Brand or not, has a distinct tendency to follow the Biblical precedent of sticking closer than a brother, and also tenaciously, to anything and everything but the particular spot desired, and although the delicate tracery of the Treacley Embellishments, thus so generously and promiscuously distributed, often run a frosted window pane very close from an artistic point of view, Examiners must not let their love of the picturesque lead them to undue ebullitions of ecstasy on this account, but must rigorously stick to a hard and fast line of action, bearing in mind that their only hope of salvation and possible promotion entirely depends on the good and strenuous work they accomplish while endeavouring to Raise the Standard of Glueing Operations.

After any material has been jointed in accordance with the foregoing hints, before sending in their next monthly report, Examiners must have that material unearthed, and, if they are not satisfied after testing it in the usual manner with a Taccyometer, they must put it through a final test, as follows :—

Mark off on a firm concrete floor an exact counterpart of your medal-day golf stance (particulars of which are to be sent to Headquarters for reference (see Form No. 3. "Stymie" + 1). Place your feet rigidly in the position thus indicated, at the same time grasping the jointed wood to be tested, at one extremity with the Right hand and the other with the Left, fix your teeth firmly into the jointed portion nearest you, and then push like er—er—anything.

Then, if the only casualties are sundry buttons or possibly a collar stud, you are quite justified in reporting that the Glueing Operation has reached a very High Standard indeed.

If, on the other hand, after carefully testing your teeth with a 1000th feeler, you discover chunks of Fractured Timber in the cavities whence you generally disinter fragments of tooth-stopping amalgam, then it is your obvious duty to send a testimonial to your dentist.

GENERALLY.

As an instance of how comparatively everyday minor occurrences if correctly diagnosed may lead to great discoveries, presume, for instance, that a small and insignificant bone from the festive kipper one is having for breakfast lodges between two of one's teeth, then, while extracting it, one will in all probability be pondering the vital question, "What's the use of these bones, anyway?" and in a flash will come the answer, "To make Fish Glue, of course." (Note, this is not an Approved Brand, but is merely given as an example.)

Between illuminating incidents like these, pregnant with great possibilities and far-reaching results in the realm of Stickinetics, it is suggested that Standard Glueing Operation Raisers might also cultivate a process of mental chemical research in times of doubt, by conjugating the verb "To Stick." For, when some tenacious problem defies Solution, they will find it very soothing and enlightening to retire into some quiet corner and commence the following mental exercises in Gluenotics, viz.: I Stick, You Stick, They Stick, We Stick, anything but the Stick (Joy or otherwise) that won't Stick, at the same time gently massaging their fevered brows and using a little liquid Glue of an Approved Brand as an Emollient.

If this fails to solve or dissolve the Glutinate Theorem, take a blank Report form and proceed to parse the following:—

Of all the Sticks
That ever I Stuck,
I never Stuck a Stick
Like that Stick Stuck,

and it's even odds of a Glue Pot to a Tube of Mendine that you are analysing the contents of your tobacco pouch before you have finished the first line, Standard Glueing Operations notwithstanding.

PROMOTION.

In order to stimulate interest and induce Examiners to exert their energies to the fullest extent and Stick at Nothing to obtain the maximum amount of information, Tips, Wrinkles, Secret Processes, Shop Recipes, Fads, Patents, Plain and Fancy methods, Everything you could mention and everything you couldn't, in Monochrome or Colours, that would tend to Raise the Standard of Glueing Operations, attention is especially drawn to the fact that Promotion will be in proportion to the Quantity of Report sent in. And although the somewhat prosaic nature of Examiners' duties prevents them from helping to raise the STANDARD of VICTORY on the Field of Battle, that is no reason why they should not help to raise the STANDARD of GLUEING OPERATIONS at home.

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(Signed) CLEAVER STICKMANN, Colonel,
for Director-General of Glunatics.

ANSWERS TO CORRESPONDENTS.

N. L. C. (Margate).—As an unskilled man, you would find it practically impossible to enlist either in the R.N.A.S. or the R.F.C., in view of your medical classification, as men in this category are expected to go into the firing line unless they have special qualifications which make them more useful elsewhere.

The pay of 3rd Class Mechanic, which is all you would receive, is 1s. per day. The age of entry is 18 years. Of course, if you were accepted for trial in the R.F.C. and were not found satisfactory, you would be transferred to a line regiment in a very short time.

G. W. L. (Great Warley).—Boy Learners in the R.F.C. are boys who learn the work of an Air Mechanic, and they have a chance of specialising in the particular trade for which they show the greatest aptitude. Your experience in electric lighting plant would certainly come in useful, though of course one cannot say whether you would be best as an electrician or as a fitter.

R. P. (Bishop's Stortford).—The only really good book which the writer has come across on building models is "Model Aeroplanes and How to Make Them," by W. G. Aston, published by Iliffe and Sons, 20, Tudor Street, E.C. The price is, one believes, 1s. 3d., post free.

W. B. S. (Leeds). Thanks for postcard. One assumes that your all-embracing ignorance of human nature, and of the difference between religion and religiosity, also includes ignorance of the simple legal fact that the sending of libellous or obscene postcards through the post is actionable in law. Envelopes are much cheaper than lawyers' fees.

C. C. (Middlesbrough).—The length of time between application for, and appointment to, the R.F.C. depends entirely upon the waiting list existing at the time, assuming the desirability of the applicant. Applicants are interviewed at the Department of Mili-

SCENES IN AN AIRCRAFT FACTORY.—VI.—THE PLANE-COVERING SHOP.—In the left foreground is indicated the scorn of the regular factory-hand for the amateur war-worker, pre-eminently concerned with her personal appearance. In the right foreground a lady is involved with a refractory plane and ladder. Behind her the severe forewoman disapproves of a work-girl who rhapsodises over her soldier-boy's portrait instead of getting on with her job. In the centre the shop-foreman, too old to control a shop full of men, inspects a roll of fabric, above which a strenuous fabric-hand stretches fabric on a plane, with dire results to the trailing edge. Behind the foreman a shop-girl becomes involved with a roll of binding-tape. Above, in the centre, a military inspector—complete in cavalry kit as fitted—inspects the work of two of the shop's star turns, oblivious of the admiration he himself excites; while, on the right, a naval inspector and a stitcher-flapper inspect one another. On the left two Amazonian ladies successfully transport a finished plane.

tary Aeronautics before appointment as cadets. If the applicant is not considered desirable, the time between application and appointment is infinite.

E. C. S. (Winton).—Your prospects of being accepted in the R.N.A.S. or R.F.C. are about equal, except that, as the R.F.C. has naturally a bigger personnel than the R.N.A.S., a greater number of appointments have to be made.

It is quite easy to live on one's pay in either the R.N.A.S. or the R.F.C., during war-time at any rate. There are no immediate prospects of the age limit for Probationary Flight Officers, R.N., and Cadets, R.F.C., being reduced.

A certain amount of experience in engineering possibly would be valuable, but if you have to mark time between the taking of your certificate and your application for appointment, it might be possible for you to arrange with the proprietors of the flying school where you are receiving instruction to keep you on as a mechanic in the meantime.

J. C. (Stroud).—Seeing you have been unfit for service up to the present, but have not been called, this seems to indicate that you have been placed in one of the inferior medical categories, in which case your only chance of getting a commission in the R.N.A.S. is to apply for appointment as Stores Officer, as Sub-Lieutenant, R.N.V.R.

C. S. (Nottingham).—The rate of pay during the probationary stage both in the R.N.A.S. and in the R.F.C. is unremunerative, but the pay of Flight Sub-Lieutenant, R.N., and a flying officer, R.F.C., works out at about £1 a day. It is quite possible to live on this pay without private means in either Service.

K. J. F. (Harrogate).—Apparently, there was no premonitory aeroplane raid prior to the airship raid on Oct. 13th, 1915, but it is quite possible that the system of premonitory signals had not then been instituted, and that a number of perfectly good Huns, who have since been interned, were then at liberty to do their own signalling. On the other hand, of course, it is quite as likely that the theory of premonitory signalling by aeroplanes is purely an effort of imagination on the part of an ingenious correspondent.

J. D. R. (Darlington).—The only people who can answer your question definitely as regards the necessity for knowing drill before joining a Cadet Wing of the R.F.C. would be those at Adastral House. Anyhow, a knowledge of drill would probably be useful. Why not join the Church Lads' Brigade and learn your catechism at the same time? It would probably be useful in the R.F.C.

L. O. K. (Birkdale).—Certainly some pilots with glasses have been appointed in the R.F.C., but generally because of some particular qualification; either they were notable pilots before the war, or they happened to be specialists in some branch of engineering which brought them in contact with the R.F.C. authorities, or they have distinguished themselves in some other phase of the war; but as a general rule it may be taken that men with defective sight have no chance of being accepted as pilots.

In your son's case, as he is a first-class shot with glasses, it is possible that he might be accepted for the R.F.C., but that comes under the heading of special qualifications. In either case he would have to pass through a Cadet Wing before appointment.

H. M. (Mitcham).—If you are 18 years of age and thoroughly physically fit, there is no reason whatever why you should be accepted for the R.F.C., unless you have some special knowledge of aeroplanes or of any other mechanical business. You are precisely the kind of man who is wanted by the Infantry.

A. C. H. (Croydon).—The only recent book on aero engines is one by Charles Kean entitled "Aeronautical Engines," which is published by E. and F. N. Spon, Ltd., of 57, Haymarket, price 6s.

P. H. B. (Rothley).—The bore and stroke of the Beatty engine are 111.1 by 114.3 mm., the weight complete is 225 lbs., the brake horse-power is 61.4. Particulars of overall dimensions may be obtained from the Beatty School of Flying, Hendon, N.

F. P. (Deal).—Apparently the minimum age for Boy Ratings in the R.N.A.S. and Boy Learners in the R.F.C. is 17. If possible, it is as well to apply in person at the R.N.A.S. or R.F.C. Recruiting Depot, as the case may be; if this cannot be done, you should write. Your local recruiting depot may be able to help you, but it would certainly save time if you got into touch with one or other of the special depots.

G. B. (Yeovil).—The only people who can give you really trustworthy advice on the registration of the design of an aeroplane are one or other of the patent agents who specialise in aeroplane work, such as King and Co., or Stanley, Popplewell and Co., of Chancery Lane. The registration of a design is in some cases more binding than a patent.

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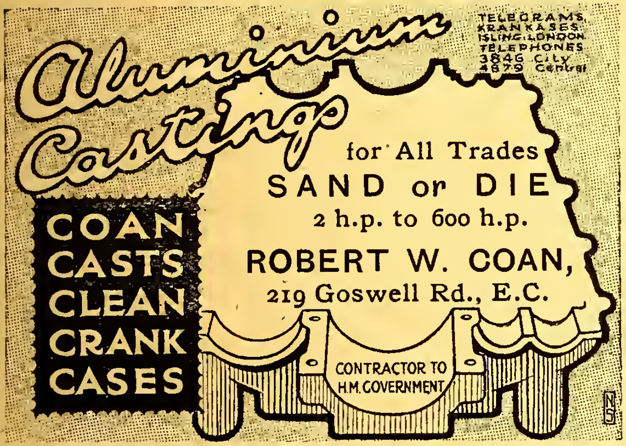
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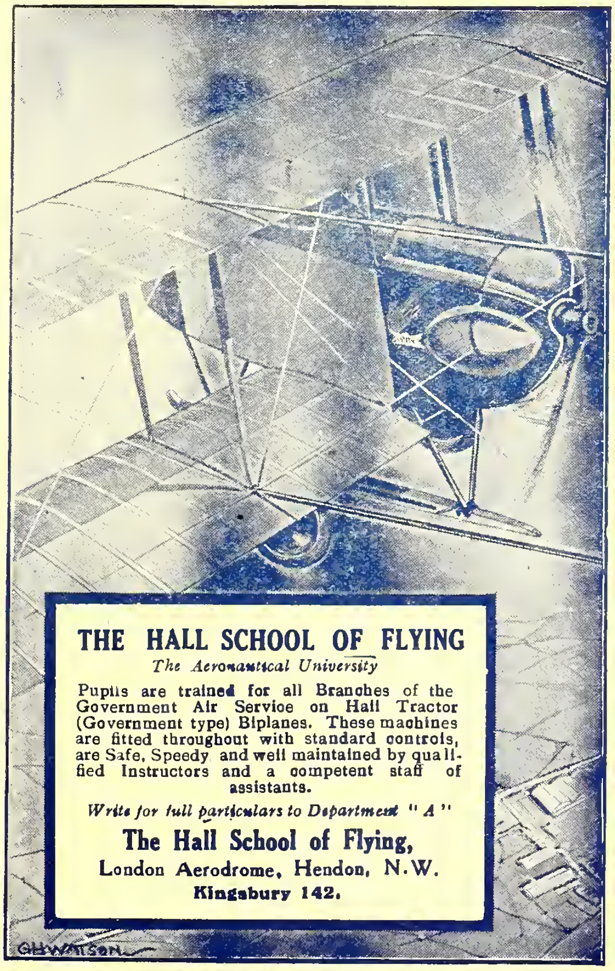

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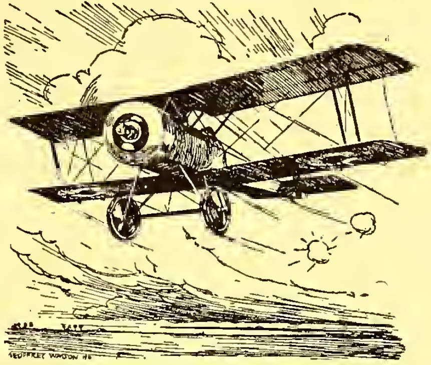

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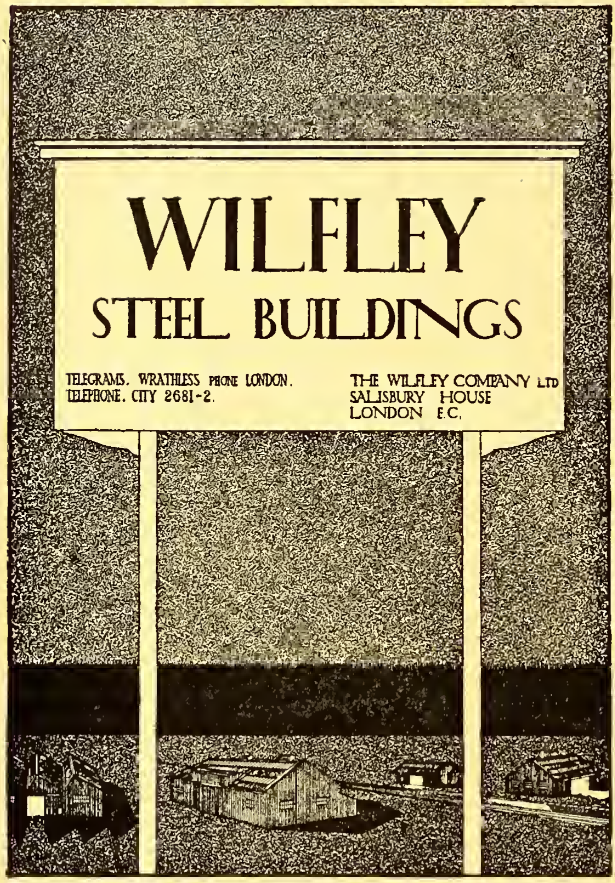

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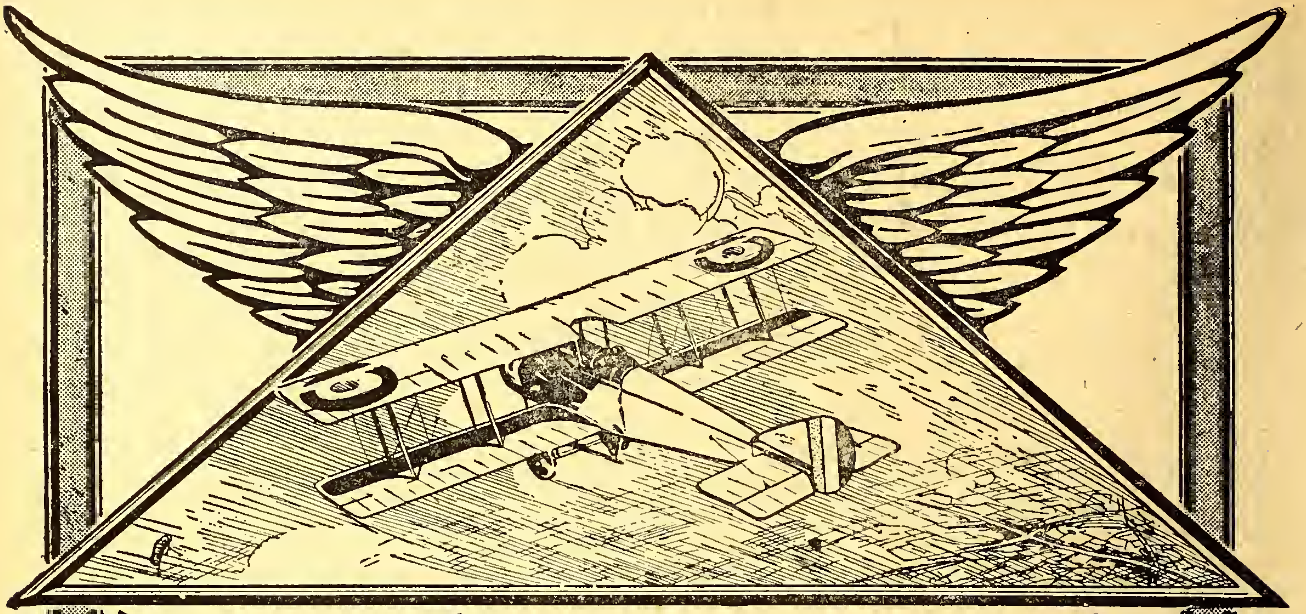

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ON SOME POST-WAR PROBLEMS.

Some day this war is going to end. This statement is made after due consideration of the danger incurred in making it. Any hint that the end of the war is in sight might have the effect of causing the British workman to slacken off his strenuous efforts to win the war by producing the maximum output of war material. Therefore a definite statement that the war is not a permanent institution demanding eternal national effort might well be considered as contrary to the Defence of the Realm Act, in that it may produce a diminution of effort. I trust, however, that my esteemed friend the Public Prosecutor will overlook this possible infringement of the Act, in view of the fact that the statement which begins this paragraph is the basis of the following thesis.

It being admitted that some day this war is going to end, one is moved to speculate as to the fate of the Flying Services and of the Aircraft Industry in the days of Peace, Retrenchment, and Reform which will follow. The subject is one of great interest to all concerned with aeronautical affairs in any capacity whatsoever.

Of Peace we may be certain for some few years, so far as the countries presently belligerent are concerned. Of Retrenchment we may be still more certain, when the English Shopkeeper again comes into power and is able to work his fell will on the Services. Of Reform we may also be certain, but one cannot be sure whether it will be a reformation forwards or backwards.

So many reforms in the past, excellent in themselves, have been ruined by the interference of civilian officials and politicians. For instance, Mr. Haldane's Territorial Army scheme was in itself a great reform which would have given us such an Army as would have ended this war long ago, if it had been carried out to its fullest extent. The soldiers at the War Office thought very highly of it, but the interference of civilian officials, and of politicians who could pull the strings of the Treasury, prevented it from developing. Thus the Territorial Army was reformed almost out of existence, and the credit is all the greater to those gallant officers and men who stuck to their Service and have given so good an account of themselves in this war.

WHAT WILL HAPPEN TO THE FLYING SERVICES?

One is therefore justified in wondering what will happen to the Flying Services after the war. They will certainly be reformed, but will they be reformed back to pre-war insignificance, or will they be reformed into a real Air Service fully capable of assuring this country against invasion in the next war?

The English People are like the Bourbons—they learn nothing and they forget nothing. They, as represented by the elect of the people in the House of Commons, may refuse to forget that we went to war with about 50 aeroplanes for an Expeditionary Force and Home Defence Army of roughly 200,000 men. And from that they may argue that even if our new-found status as a Military instead of a Naval Power demands after the war a standing Army of 1,000,000 men, our Royal Flying Corps need not be in any higher proportion than it was when we began this war. In which case we shall need, in time of peace, some 250 aeroplanes, or about 21 squadrons all told.

Which would mean 500 aeroplanes in all, including the regulation 100 per cent. reserve. And, allowing for maximum replacements, that again would mean a total of 1,000 machines per annum for the Royal Flying Corps. The Royal Naval Air Service would probably need about 250 per annum on such a basis.

Those figures represent a healthily pessimistic view of the subject, but they are worth considering, when one remembers what happened before the war, in the days when Colonel Seely had the nerve to assure a large gathering at the Royal Automobile Club that there was never any lack of money for aviation, at the very time when the Aircraft Industry had been very nearly starved out of existence.

THE BEGINNING OF AN AIR SERVICE.

The optimistic view is that, when the war is over, we can begin to build up an Air Service which will assure to us absolute command of our own air, even if we do not have the ambition to command the air of our neighbours, and so invent a new infraction of the Tenth Commandment.

We have been assured by General Brancker, than whom there is no clearer thinker concerned with aeronautics, that there is a vast commercial future for aircraft. He made his confession of faith publicly for the first time in his brilliant lecture to the Aeronautical Society on the occasion of its first meeting this year, and he repeated his belief at the Society's otherwise somewhat nebulous, or perhaps one should say crepuscular, meeting at the Automobile Club on Wednesday last.

There exists among a certain section of the Aircraft Industry, which is closely in touch with those who control the Flying Services, a strongly optimistic feeling that the Industry is assured of the confidence of the High Authorities during the war and of the support of the said Authorities after the war. It is said that the Air Board has expressed its intention to rely on the Industry for new and improved designs during the war, which in the light of past experience appears a very wise decision.

Should these views prove true, then we may be assured of an adequate supply of new and improved aeroplanes with which to defeat the present enemy in the air, and of the existence of an Aircraft Industry at the end of the war which will then enable us to begin to build up an air fleet sufficient to maintain our insular integrity in the future. But it is well to remember that only when the war is over can we begin to build our real air fleet.

THE NEED FOR IMMEDIATE EFFORT.

So long as the war continues, we can at best merely keep a little ahead of present needs. Any fighting pilot freshly back from active service will tell you that to-day the Royal Flying Corps is fully occupied in holding its own against the latest German machines. And it is obvious that increased efforts are necessary on the part of the Aircraft Industry and of the officials of the Air Board to reach and maintain that position a little ahead of present needs, which means holding with confidence a dominant position in the air over the war area. And, even so, such a dominant position does not mean absolute command of the air, which certain unduly optimistic people claimed for us in that past.

A SLIGHT DIGRESSION.

At this point one may perhaps digress for a moment in order to indicate to the Air Board a direction in which it might pursue investigations with possible advantage to future design and output of aeroplanes. If the Air Board does really place confidence in the ability of the Aircraft Industry to produce aeroplanes fit to defeat the enemy, it will do well to keep an eye on the Design Departments of both the Flying Services.

The finest aeroplanes of to-day are those which have been produced without interference, and generally without advice, from officials of either Service. Some have been produced in actual defiance of officialdom. Yet, if gossip and hearsay does not lie extraordinarily, the aforesaid Design Departments are still allowed to hamper enterprise and originality.

It would be difficult—indeed, it would be impossible—to find in either Service a technical official who has produced an aeroplane or an engine which has been within reasonable distance of performing as well as the best contemporary "trade" machine or engine. Yet these same officials, who have in some cases been proved failures as producers, and who in some cases have been proved to have hindered the production of improvements by others, have still the power to approve or disapprove the designs of men who have a record of achievement behind them, and who have evidence of their success actually flying to-day.

A HORRIBLE POSSIBILITY.

It may be, unless care is taken by the Air Board in due time, that some such department as that concerned with military aeroplane design—the initials M.A.D. are ominous—will succeed in foisting its own designs onto the R.F.C., much as the Royal Aircraft Factory planted its designs and engines—before the time when the Factory was reformed—and so sent our pilots fighting Fokkers on B.E.2cs. when they might have been on the newer Sopwiths and de Havillands.

One hears already of difficulties experienced in procuring the latest successful engines for promising experimental machines, though such engines are already fitted in appreciable numbers to machines of official designs. And one hears further that certain of such official machines, complete with engines, are kept lying in store, pending investigations into their design, owing to suspicions caused by a fatal breakage in the air.

It would be a national calamity if, after all the good work done in reforming the Royal Aircraft Factory, all the same trouble were permitted to arise again under the administration of the Air Board. A civilian "expert" is none the less a civilian for being in uniform, and none the less an "expert" of the kind once so elegantly described by General Henderson.

UNIFORMED CIVILIANS.

Men who are so little value to the Industry that they are not likely to be claimed as "indispensable" before their local Tribunals may find it convenient to accept the small pay of the junior commissioned officer. But the fact of their being in uniform does not entitle them to assume a superiority over men of higher technical attainments, whose services are paid for by acute business men at a rate which the uniformed technician could never hope to attain.

He would be a brave man indeed who would claim that the purely technical officers in either Flying Service have more knowledge of aeroplane design and construction than have the chief, or perhaps even the second or third, designers of the successful aeroplane or engine firms. And if such technical officers have not such superior knowledge, by what right do they presume to impose their wills, or their fancies, on their technical superiors?

The Air Board might do well to consider these points, and further to consider whether the closer association of aircraft designers with active-service pilots, by means of conferences with recently returned pilots, or by sending designers abroad to study aeroplanes under active-service conditions, would not improve the quality and quantity of aeroplanes more than setting up departments full of uniformed civilians whose chief aim is to prove the impossible proposition that they know more than their superiors in intellect and experience.

OUR FUTURE AIR FLEET.

However, to return to that post-war problem. It seems to be assumed in most quarters that the Royal Flying Corps, at any rate, will be kept up to full strength after the war, as the beginnings of our great Air Fleet. One hopes that it may be so, but a war-bored people may elect a Pacificist Government, so one never knows.

The Royal Naval Air Service, even if it is to be in future nothing more than an auxiliary to the Fleet, must increase very greatly in size. Unless, again, a wave of Peace-madness engulfs the British Empire.

Nevertheless, even at the best, with both Services flying under peace conditions, the consumption of aeroplanes cannot be great enough to absorb the output of the Aircraft Industry as it will be by the end of the war. Therefore output must be reduced till the next boom in aeroplanes comes along, for whatever reason.

REDUCTION OF OUTPUT.

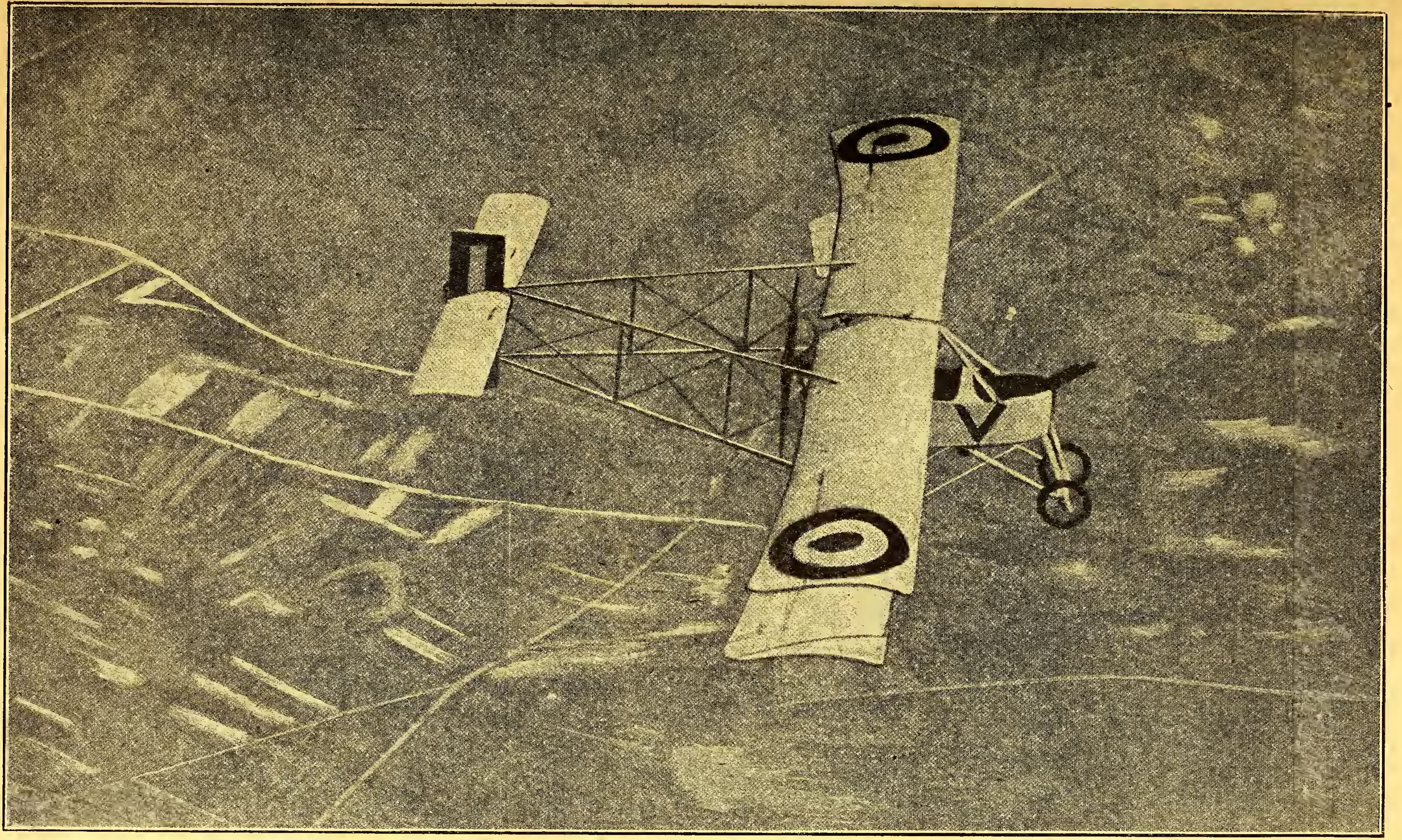
To a very great extent, output will decrease automatically. Overtime in the factories will cease, simply because all hands will want to ease off from the present long hours. Also, night work will cease.

The mere cessation of overtime may not make a vast difference, for it is conceivable that if everybody worked at top speed for normal working hours they might produce as much work as they do now, when the speed of work is lower and the hours longer. Overtime being paid for at an increased rate, there is always a temptation to slack during normal hours, so as to make overtime necessary.

Government offices are notorious in this respect, but that is another story for another day.

THE WEEDING-OUT PROCESS.

There will also be a large amount of weeding out among the firms themselves. Many firms which have been more or less dragged into the Aircraft Industry will with pleasure return to their original occupations, such as piano-making, motor-body building, general engineering, and so forth. Other firms, rushed together in a hurry, and able to exist and to make handsome profits at war prices for aircraft, will doubtless expire under the stress of competition, when the making of



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OVER THE LINES.—A French armed and armoured Voisin biplane on patrol duty, photographed at close quarters from another machine.

profits will depend on scientific management in both works and offices.

Some of the big aircraft firms, whose enormous output is obtained by sub-contracting much of their detail work or parts to minor firms, will find those minor firms returning to their original occupations, and so will be unable to turn out anything like as many machines as formerly, though probably well able to keep their big factories running full time.

In this way the total output of the Industry will be reduced to a fraction of what it will be on the day when peace falls upon the world, for the time being. Nevertheless, that total output will be vastly greater than anything which would have been believed possible even two years ago. The problem is, what is to become of that output?

How to Dispose of Output.

Everyone seems to assume that the few remaining neutral countries will rush to buy aeroplanes in England. Personally I doubt it. Most of the neutral countries are in America, and the Pan-American Aero Exposition held last month in New York—reports of which have not arrived at the moment of writing—has probably fixed most of the South and Central American nations for good. The capacity of the astute North American business man for influencing business—one would not call it graft—coupled with the capacity of the Latin-American for receiving such influence, has probably resulted in the buying powers of the smaller American Republics being mortgaged for ever.

There is little enough to be done with European nations in future. France and Italy can look after themselves. Germany will get most of Sweden's trade. The capacities of Norway, Denmark, Holland, Belgium, and Spain are limited, and the French Industry will have its share of them all. Russia will probably make her own aircraft, or will only buy from branches of British firms who manufacture in Russia. And the various States of Balkan brigands count for little.

Therefore we are tied down, for all intents and purposes, to the British Empire for the consumption of the major portion of the output. Australia will make most of her own machines, as will Canada, and South Africa may do the same.

Subsidised Aeroplanes.

It is true that the Services will need a very large number of aeroplanes, but the Industry must learn in good time to look to its own energy and commercial ability for the disposal of its output.

There seems to be a general idea, which, since it appeals so forcibly to the daily Press, is probably wrong, that the great future for aeroplanes is as mail-carriers, run by lines subsidised by the Government. The analogy is constantly quoted of the great steamship lines, the ships of which were subsidised so that they would be ready for use as auxiliary cruisers in time of war.

A pretty costly game it seems to have been, seeing that some of our biggest and best ships, which might be of great use now in bringing supplies from abroad, have been lost in one way or another when doing some job that might have been as well or better done by smaller and cheaper ships. The wastage of tonnage of those which still survive has been prodigious.

Also, it seems to be assumed that postal aeroplanes in thousands are going to be used all over the British Empire, all under Government subsidy.

Before jumping to this conclusion it is as well to recall Mr. Handley Page's very practical warning during his recent lecture, to the effect that aeroplane mail-carrying does not become a practical proposition until the distance to be covered is so great that possible delays, owing to bad weather, especially fog, do not prevent the aeroplane from beating the train or other transport over the same route.

For example, by the time mails had been taken to Hendon, put into the machine, flown to Castle-Bromwich, unpacked, and motored into Birmingham, they would be beaten by the L. & N.W. Railway's normal two-hour trains. From London to Edinburgh the aeroplane would only score if not delayed by any mishaps. From London to Paris, owing to delays in transhipping at Dover and Calais, it would score every time, bar very unusual delays, especially if the difficulties and dangers of landing in fogs be satisfactorily overcome, somewhat as indicated by Captain Groves, R.N., and M. le Commandant Bernard, of the Service d'Aviation Militaire, at the last meeting of the Aeronautical Society.

Under similar circumstances a mail line from London to Petrograd, with stops at Cologne, Berlin, and Warsaw only, would be a perfectly sound proposition.

Passenger Services.

Such subsidised lines could probably afford to run passenger services as well, and one awaits with great interest the views of Mr. Holt Thomas on this point, when he lectures to the Aeronautical Society. As one possessing business capacity amounting to genius, coupled with unusual foresight, as exemplified by his staking so much on the future of aircraft when the possibilities seemed so remote, he should be able to place convincing figures before his audience—provided always that his enthusiasm for aviation overcomes his business instinct, which might very well prompt him to keep a good thing of this nature for the benefit of his own firm.

Certainly many people would rather fly direct from London to Paris than endure the agonies of sea-sickness and the discomforts of transhipping at two ports. A big aeroplane is vastly steadier than a cross-Channel steamer. One imagines the London-Paris line to be the most likely as a first venture. Doubtless in time we shall achieve a trans-Atlantic line also, but one fancies it will be many years ahead.

There are also possibilities for enterprising transport companies to run lines of big flying boats abroad. Much could be done on the Amazon and the La Plata, as well as on the great rivers of India, Burmah, China, Mesopotamia, and Africa, with passengers, mails, and even light goods traffic.

In South Africa and Australia, and other countries where railways are scarce, there are openings for overland aeroplane lines also.

Machines developed for these purposes would be of war value for the transport of troops for certain specific operations, and for the bombardment of enemy towns far behind the area of land fighting, probably chiefly for the latter. For such reason it is assumed that enterprises of the natures indicated will be subsidised by Governments of the future. There is, however, another species of undertaking which, so far as one can gather, has never been discussed, and to this I would particularly draw attention.

Subsidised Sport.

Has it occurred to anyone that, if the big steamship lines had never been subsidised, we should still have had the same high-speed liners, susceptible to commandeering at need? Further, has it occurred to anyone that, if previous Governments had subsidised motor-boating as a sport, and the production of efficient oil-engined trawlers as an industry, we should have been very much better equipped to deal with enemy submarines? The Americans already subsidise motor patrol boats.

We should then have had 30-knot motor-boats of sea-going size, instead of being let in for that astounding

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purchase of American motor-launches, a gross scandal which one earnestly hopes may be exposed some day. Ask any member of the crew of any "M.L." boat if you want to know something about it.

Also, we should have had a better class of minesweeper in big oil-engined fishing-boats such as the Danes use, than we have in our venerable steam-trawlers as used to-day.

If one bears this in mind, one may see the wisdom in future of encouraging officially the production of sporting aeroplanes, with a view to future wars. One has been told, *ad nauseam*, that Waterloo was won on the playing-fields of Eton. We are told to-day that horse-racing and hunting must be continued for the proper provision of horses for our cavalry. Yet years ago, when I pleaded for official encouragement of aeroplane racing, so that we might improve the design of our aeroplanes and the skill of our pilots, I was merely regarded as a somewhat unamiable crank. The "best brains in the world" at the Royal Aircraft Factory were going to make all that unnecessary.

A Backward Glimpse.

At the outbreak of war we had some few fast machines, Bristol "bullets" and Sopwith "tabloids." Such simple little machines could have been built in hundreds in the time which was wasted in merely correcting the drawings of those fatal B.E.2cs. of 1914-15. But even those officers who admitted the possible value of the fast small machines lamented that there were no pilots to fly them.

The people who could and did fly them were the humble individuals who used to compete in vulgar aeroplane races before the mob at Hendon and Brooklands, and who used to race from Hendon to Manchester and back, or Hendon to Brighton and back, or Hendon to Paris and back. Some few Naval and Military pilots could also fly them, but they were of the kind who had previously been regarded rather askance as "stunters," and who had been in the habit of stealing away from the official aerodrome to practise tricks on the quiet.

Will anyone now dispute the statement that, if aeroplane racing had been taken under the wing of the Service Authorities and made into a gentleman's sport, like hunting or steeplechasing, and if officers had been encouraged to compete on Service machines—as they were in Germany—we should have had better aeroplanes and more skilful pilots at the beginning of the war, without any appreciable extra cost to the Services?

To-day we run Scout Schools—as General Brancker stated in his lecture—for the express purpose of teaching the very things which every racing pilot had to learn if he wished to be a success in aeroplane racing.

Real Flying Clubs.

After the war a certain number of people will leave the R.N.A.S. and R.F.C., some because they are not wanted, and some because they are "fed up" either with flying or for more personal reasons, though it seems unlikely that either Service will decrease in size, unless the then Government goes suddenly mad. Anyhow, those who leave will swear that they never want to see an aeroplane again. And after a month or so on the ground they will come to the conclusion that the ground is boring, and they will want to fly again.

Thousands more, of the cavalry, gunners, and infantry, having seen the aviators at work over the enemy's lines, have already come to the conclusion that this flying game is in truth a *sahib's* sport, and such of them as have any money will want to take it up. And, thanks to munitioneering and the consequent shifting round of money, there will be many young men who will be able to afford to fly, and who have no hereditary taste for hunting or steeplechasing or polo.

Here then is the chance for intelligent managers of aircraft firms to start real flying clubs, where such young men can be provided with an aeroplane, an aerodrome, a shed, mechanics, and everything, all in, for an inclusive sum which should not exceed the price of a couple of decent hunters and the cost of hunting them two days a week in a first-class country.

It should even be possible to lay down a set sum for the guaranteed use of an aeroplane, without definitely purchasing it, much as one hires a boat for a season. Without going deeply into figures, I should say that a man ought to be able to get a season's flying for between £250 and £300, all in, if he were satisfied with a little single-seater of the kind recently produced by Mr. Beatty at Hendon. Even a light two-seater like the L. and P. need not cost much more for a year's use.

Encouraged Competition.

Competitions between such flying clubs should be encouraged by the firms and by the Government. There would have to be definite classes for machines with engines of certain cylinder capacity, and for single-seaters, two-seaters, and so forth, but that is farther ahead than one need go at present.

The point is that if firms will go into the matter as a commercial proposition, based on the idea that an aeroplane can be built and sold for a matter of £300 to £400, including a 50-h.p. or 60-h.p. engine, they will find that they can make a reasonable offer to would-be aviators after the war.

The S.B.A.C. could doubtless find ways in which members could back one another up. Engine-makers could help aeroplane-makers in establishing a joint aerodrome and flying club, and by providing engines on a running agreement, instead of insisting on purchase outright.

Then the Services could come in by handing over aerodromes which are not required after the war, on the condition that the firms keep the sheds and ground in order, and maintain the workshops at an efficient pitch, for readiness in time of war, and for use by visiting aviators of the Services.

The clubs might be founded on a Territorial basis, and the members might form part of the local Territorial section of the R.F.C. And then they could be regularly subsidised. Local mechanics might be enrolled as A/Ms. (T.F.), as part of the scheme of compulsory military training which must surely be retained after the war if this nation is to retain its importance.

Training the Young.

Youngsters should be particularly encouraged to join as volunteer mechanics (T.F.), and a Government grant should be given to enable a proportion of them to learn to fly. As a very able Staff Officer of my acquaintance remarked recently, all foreign nations have "slipped up" on the age question. They enrol their conscripts between the ages of 18 and 22, when they ought to be progressing in their trades. The average working-class boy goes to pieces and gets into bad habits between the ages of 15 and 18, when he is too big for discipline at home and is under no discipline outside. He says that boys should be raked into the Army from 16 to 18, and properly disciplined, educated, drilled, and fed, just when it will do them most good. Then at 18 they can go out and learn a trade, or among the better classes a profession, after a very salutary Army training. Herein I cordially agree, for a well-fed lad between 16 and 18 can endure as much fatigue as he can later, and he recovers from over-fatigue quicker.

On this principle youngsters who wished to do so could learn to become Air Mechanics at one of these subsidised flying clubs, their training, if carried on for

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the full two years, to count as military service, and so a big supply of trained mechanics would be created.

A Scheme in Outline.

The paying members of the clubs, who flew for fun, would be subject to rules and regulations while on the premises, but the regulations would be no more irksome than those of an R.F.C. mess, which means merely that an aviator would have to behave like a gentleman, and that his manners would have to be no worse than those current in any decent London social club.

A skilfully contrived mixture of a sporting club and a Territorial depot offers advantages alike to the Services, the Aircraft Industry, and the people who want to fly, or who merely want to work on aeroplanes. It is not half so fantastic an idea as is Mr. Kipling's "The Army of a Dream," which is in itself a workable idea to which this suggestion really owes its origin, though subconsciously up to this moment.

Anyhow, there is the rough idea of a commercial future for a class of aeroplane which seems to be left out of reckoning by people whose ideas soar to ocean liners of the air and Paris-Pekin postal-packets. If this flying-club scheme, or anything along similar lines, meets with official approval, there will never be any lack of pilots for high-speed destroyer aeroplanes, who will give the ex-postal-packet bomb-droppers a very unhappy time when they go to war.

And, after all, there is no reason why aeroplane racing and inter-club competitions should not be just as much a sport for officers and gentlemen as is steeplechasing, hunting, polo, or gymkhana tricks, provided always that the competitions are run under proper control, and are not allowed to fall into the hands of circus proprietors, showmen, theatrical impresarios, and so forth.

One may suggest, also, that in years to come the Army will be much more representative of the people of the country than hitherto, and that closer contact with what is left of the old military caste may raise the general tone of the new officers, so that there should be little danger of these flying clubs and their competitions having a deleterious influence on the members of the King's Services.—C. G. G.

TRAINING.—VII.

BY "BERKELEY."

Commencing Action.

The beginning of a general action in open warfare is usually the collision between the advanced guards (of whatever category) of the opposing forces, including an artillery combat as indicated in the previous article. In this combat the cavalry take a considerable part if conditions are favourable for their use, driving in "the enemy's advanced troops" to a point when shock action would bring more certain disaster on the attacker than on the attacked.

The preliminary action may be of considerable duration and intensity, the importance varying with the character of the ground and also with the disposition and state of preparedness of the main bodies of troops in the rear.

Success at this time will give the initiative to the victorious commander, and he will be in a position to put his plans for the greater action into effect, modified naturally by the information gained not only by his aeroplanes but by his advance guard. The relative strength of the resistance at various points of the line held by the enemy advanced troops, when compared with the intelligence received from those whose work is in the sky, will give some indication of the positions regarded by the enemy as important.

Early Artillery Action.

The present war has added greatly to contemporary military veneration for the powers of artillery. It is likely that in future the earliest opportunity will be taken to bring the guns into action. This theory has always been held by soldiers with a due conscience of military propriety, but the fear of losing the one-time rare and valuable weapons has been a frequent cause of hesitancy in their initial employment.

But the necessary complement of artillery is the infantry, or perhaps it would be wiser to invert the order, as infantry is in truth the primary arm employed in the development of the art of war. Without the support of artillery, the infantry can do but little, and, without infantry, no advantage could be taken of the designed destruction wrought by the guns.

Napoleon I knew it, and made use of his knowledge. Napoleon III ignored the principle, and developed the small arm alone (and, *en parenthèse*, the machine-gun), and thus ensured the extinction of his armies when von Moltke's legions took the field in the meteoric campaign of 1870.

Choosing Terrain.

Therefore, if a commander has decided upon the section of terrain on which he desires to give battle to the enemy, and can by the control of the initial hostilities between advance guards select his own battle ground and under his own conditions, he will at once develop his artillery attack simultaneously with the beginning of his infantry dispositions. He possesses the initiative and he knows his intentions. He must then put them to the test.

Strategical dispositions are designed with a view to bringing about the decisive battle, or a series of battles based on a decisive result. In strategy it is generally desired to arrange a concentration of troops at one point (or more if the occasion demands it) at a moment when the instinct of self-preservation will compel the enemy to cease his attempts against all other portions of one's own territory, and to endeavour to counter the blow-in-being just a little too late for success. So far the art of war is in a sense geometrical.

The blow in question is the battle consequent on concentration, and in the battle lies the secret of success, for, as Clausewitz says ("On War," Bk. IV, chap. iii), "*The tactical successes* are of paramount importance in the art of war."

Attack on Strength.

The prosecution of the battle in itself involves many of the principles common in strategy. The same principle of concentration on a selected part of the enemy front is brought into operation on a tactical scale. The section of the front to be selected for attack is, in the view of a large body of military authority, that which represents strength rather than weakness.

To attack strength and succeed is to prevent any adequate support on the part of enemy reserves, always provided that the weaker portions of the line are attacked with sufficient determination to keep them fully occupied. The enemy, of whatever degree of military skill he may be possessed, is constitutionally afraid of what may happen to his tactically weak positions. He will

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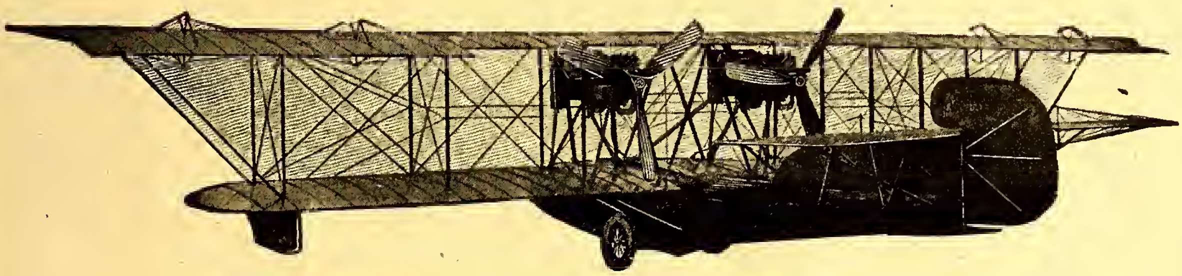

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therefore endeavour to protect them in as effective a manner as he may.

ATTACK ON WEAKNESS.

An attack on a weak position is often countered by use of the enemy reserves, and the strong points on the line are not seriously affected. On the other hand, an intense attack upon strength may result in the engagement of the majority of the enemy's available reserves, with, as a result, the disastrous further weakening of those positions which possess little or no inherent strength. An attack at this stage, directed against these defective areas in the opposing front, will probably, other things being equal, result in a rout of the enemy.

THE EVER-PRESENT PRINCIPLE.

At all times during the campaign, and in each moment of the battle, the real objective in war—the destruction of the enemy forces—must be an ever-present principle. The most perfect of manœuvres, the most beautiful and orderly of conflicts are as nothing unless heavy casualties, material or moral, are inflicted upon the enemy, or unless the tactical results lead inevitably to disaster in the ranks of the King's enemies.

War is not comparable with pugilism. It is death, and not a momentary oblivion, that must be inflicted on the other party in the quarrel. Self-preservation inspires the determined ferocity of the greater duel.

Every act in a battle, therefore, should be directed at the destruction of the enemy. A tactical gain, unless in conjunction with other local successes, brings about the disorderly retirement of the opposing forces, or is the cause of heavy loss to the attacked troops, is of no value, and may be of considerable danger to one's own side.

THE IMPORTANCE OF CAVALRY.

The battle proper is an affair of the infantry and the artillery, aided in the opening and at the ending by the cavalry, whose duties during the intensity of an action are becoming of less and less vital importance.

In the opening stages the cavalry are responsible for a reconnaissance in strength and for the driving in of the enemy advanced guard or outposts. During the main action modern theory ordains (no less than did Napoleon I) that all available mounted troops should be massed at a point of readiness in preparation for the work of harassing the enemy when broken, or, if the gods are unkind, of covering the retirement of the army of which it is a part.

An enemy on the retreat should never be given a moment in which to recover. A constant pressure should be exercised on the wearied and dispirited forces, whose journey, homewards though it may be, is dispossessed of all inherent attraction. The cavalry, whose mission on earth in peace is to be beautiful, is not loth on these occasions to accept a glorious hour of useful life.

THE FRENCH VIEW OF CAVALRY.

The French view of the major use of cavalry is that given by Commandant Colin in his "Transformations de la Guerre" (Part II, Chapter IV, Major Pope-Hennesey's translation) :—

"Even if one must no longer reckon on useful charges during the course of the battle, cavalry remains essentially the pursuing arm, that whose action is the most irresistible and most efficacious on demoralised troops in process of breaking up. Perhaps at times it will be necessary for it to use its carbines against some units still capable of offering resistance, but very often it will still be able to produce great results by the mere rapidity of its action.

"'Whenever possible,' said Napoleon, 'we should always prefer the thunderbolt to the gun.' There are no mounted troops, however little accustomed they may be to the use of the sabre, who have not found opportunity to charge rather than to shoot. The Boers, who normally only used the rifle, and merely employed their horses as means of transport, charged several times when they fell unexpectedly upon British troops. The great cavalry leaders of the American Civil War, in spite of the great use they made of dismounted action, made numerous and fine charges."

THE PURSUIT.

In the dissemination of death and despair in the ranks of a routed enemy, both of the newer weapons of warfare may take a part. When in time the "tanks" become more nimble of gait, they will be capable of preventing an early reforming of the enemy during

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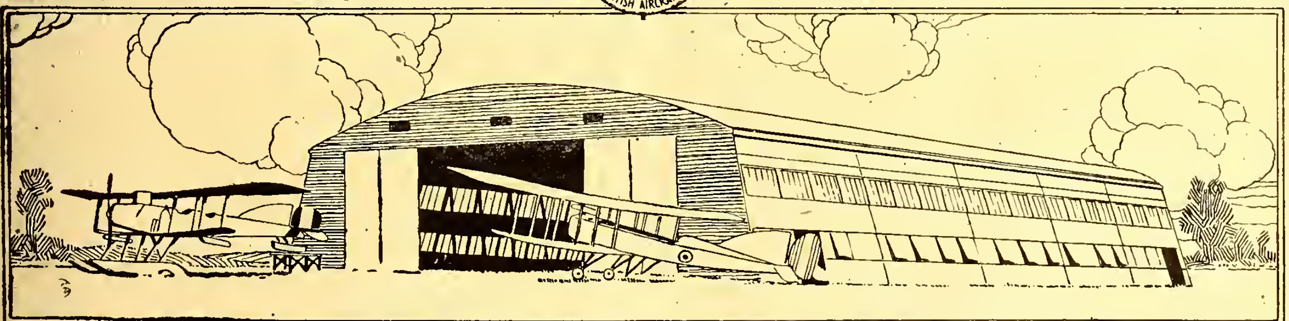

retirement. Ponderous as they are, their services in the detonation of road mines left by a malevolent foe will in their self-sacrifice clear the ground of unnecessary dangers to the following cavalry, and will give an added theme for the heroics of the Olympian correspondents with the forces in the field. The duties of the "tanks" on these occasions will closely resemble those of the cavalry.

Aeroplane Pursuit.

The fighting aeroplane can also be of the highest value in completing a rout already in progress. Squadrons of aeroplanes flying at a height of two or three hundred feet will, by the assiduous and well-directed use of their full armament do much to disarrange the heads of the retiring columns.

If the rearguard is left to the cavalry and the "tanks," the entire effort of the allotted aeroplanes can be concentrated on the main body of the enemy. Defeated, weary, and dispirited, it may be that even a moderate attack from above would be successful in preventing a reforming of the line.

An enemy prepared for attack and coolly awaiting developments would probably, under existing aeronautical conditions, make an aeroplane offensive one of infinitely greater danger to the aircraft employed than would be justified by the results. There are at such times duties proper to aircraft which are of more importance to the adequate prosecution of war.

But when a retirement *en masse* begins, its encouragement is the first principle in that chapter in the art of war. Thus the employment of aeroplanes in this way is justified, as all steps that lead swiftly to success are justified. The risk will be greatly reduced by the decrease in *moral* of the defeated legions. The covering screen of the rearguard will be rendered less effective, and the only hope of the vanquished is thus removed.

Confusion of Transport.

At the same time the masses of transport, whose proper direction of travel is inverted with a certain degree of inevitable confusion, especially if optimism is a prevailing feature of the enemy psychology, should be attacked both by machine-gun fire from above and by bomb attacks carried out with precision in the act, as well as in the report at the end of the day's work.

Rail-head could with advantage be similarly attacked by a well-disposed long-range squadron of aircraft, while the symmetry of strategic railways feeding the area held by the enemy troops, could be disarranged. Bridges over rivers in the direct line of retirement are also well defined objects of attack, the destruction of which may be disastrous to the enemy.

The Need for Initiative.

But for this manner of operations to be possible it will be necessary for the victorious army to possess the initiative in the air as well as on the ground. He must be in a position to force action on opposing aircraft, or be sufficiently powerful to drive them away without actual combat. An equality in the air is not sufficient.

* * *

THE LATE MAJOR GOODDEN.

It has been brought to my notice by certain of my friends, for whose opinion I have the greatest respect, that the obituary notice on the late Major Goodden, R.F.C. (S.R.), published in this paper, has caused pain and sorrow to that aviator's relations.

It is proper to say that the outline of Major Goodden's career therein contained was written with no thought of injury to his family, or to his personal reputation in life.

Public polity dictated its terms and the interests of the Royal Flying Corps gave the reason for its appearance. The times are critical, and the manner of public government peculiar to the prevailing conditions. Hence it appeared proper to dispense with the conventional flattery of the customary memorials, and to replace it with an honest, if possibly inopportune and regrettable, expression of opinion as to a prevailing method of bestowing rewards for services rendered.

Military promotion is earned by efficiency and devotion to duty in His Majesty's Armed Forces at home and abroad. Faithfulness to employers, accompanied by personal bravery, can be adequately acknowledged in many other ways to those whose road through life lies parallel to, but not within, the area of military comity. —C. G. G.

THE PARLIAMENTARY AIR COMMITTEE.

Mr. Joynson-Hicks, Unionist member for Brentford, has been appointed Chairman of the Parliamentary Air Committee, in the place of Mr. Wilfrid Ashley, now private secretary to Mr. H. W. Forster, Financial Secretary to the War Office.

The Parliamentary Air Committee has already done good work in a quiet way, and, while one hopes that it will have no cause to agitate in order to accelerate the work of the Air Board, it is as well that it should continue its existence just to keep its eye on aeronautical progress.

Mr. Joynson-Hicks is well known as one of the first members of Parliament to devote attention to Aerial Defence and to the welfare of the Flying Services, therefore his elevation to the Chairmanship of the Parliamentary Air Committee seems a very just recognition of his work in the past.

THE DIRECTOR OF AIRCRAFT CONTRACTS.

It is unofficially made known that Mr. Arthur E. Turner, well known to the Aircraft Industry as controlling aircraft contracts at the War Office for a long time past, has been appointed "Director of Aircraft Contracts" under the Air Board, which indicates that at last both Naval and Military contracts are co-ordinated under one control.

The State and the Aircraft Industry alike are to be congratulated on the fact that the Contracts Department is in the hands of one with so long an experience of the intricacies of aviation, and who is universally recognised as a business-man in every sense of the word.

Those who have come personally in contact with Mr. Turner hold him in the highest esteem, as one who combines strictly businesslike methods with the ability to see the other man's side of the argument. The result has been that among all Government Departments concerned with Aeronautics in both Services none has been conducted with greater freedom from friction between officials and manufacturers or aircraft traders than has that over which he ruled, at first at the War Office and later at Adastral House.

His appointment under the Air Board should help very materially toward that "constant and liberal supply of the most up-to-date machines" which Sir Douglas Haig demanded in his dispatch of Dec. 23rd last.

THE AERONAUTICAL HISTORY EXHIBITION.

The Aeronautical History Exhibition, which the Countess of Drogheda has so successfully organised at the Grosvenor Galleries, Bond Street, is drawing to its close, and those who have not yet seen it should make a point of doing so at once.

Meantime, several handsome donations for the Irish Hospitals Depot Fund have been received, and Lady Drogheda wishes to acknowledge the following, which have arrived since the last list was published:—

A. V. Roe and Co., Ltd., £25; Simpson Bros. (Hapton), Ltd., £1; The Standard Motor Co., Ltd., £5 5s.; Thomas Firth and Sons, Ltd., £26 5s.; Messrs. Swift, Levick and Sons, £2 2s.; Messrs. Fowler and Smith, £1 1s.; The Regent Carriage Co., Ltd., £1 1s.; Thomas Smith's Stamping Co., Ltd., £5 5s.; Barclay Curle Co., Ltd., £10 10s.; Miralite, Ltd., £2 2s.

The proceeds of the exhibition, and its attendant subscriptions, will go to the Irish Hospitals Fund for buying and making supplies for various hospitals, a goodly proportion being specially set aside for the Royal Flying Corps Hospital, so that whether readers of this paper contribute to the Fund (subscriptions should be sent to Lady Drogheda at 40, Wilton Crescent, W.) or merely visit the Exhibition for their own amusement, they are contributing to a thoroughly worthy object.

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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Feb. 27th, 1917.

Admiralty, Feb. 22nd.

R.N.A.S.—Proby. Flt. Officer to be Flt. Sub-Lt. :—F. J. Vincent, Jan. 24th.

War Office, Feb. 27th.

REGULAR FORCES.—The following N.C.O. to be temp. Sec. Lt. :—

Memorandum.—For duty with R.F.C.—L.-Cpl. R. V. Waters, from Can. Corps Cyclist Bn., Jan. 25th.

Establishments. — R.F.C. — Flying Officers.—Sec. Lt. E. A. Lloyd, Yeo., T.F., and to be secd., Feb. 1st; temp. Lt. G. Budden, R.E.; Sec. Lt. G. C. Young, Sea. Highrs., from attd. Garr. Bn., R. Scots, and to remain secd.; temp. Sec. Lt. (on prob.) J. H. Forbes, attd. R. Fus., and to be transfd. to Gen. List; temp. Sec. Lt. R. H. Ayre, Gen. List; temp. Sec. Lt. A. Watson, Gen. List, Feb. 6th; Sec. Lt. J. H. Muir, Spec. Res.; Sec. Lt. W. E. Dawson, R.F.A., T.F., and to be secd.; temp. Sec. Lt. J. E. S. Long, attd. R.W. Kent R., and to be transfd. to Gen. List; temp. Sec. Lt. G. D. Smith, Gen. List; temp. Sec. Lt. D. A. Neville, Gen. List, Feb. 7th; temp. Capt. A. G. Waller, A.S.C., and to be transfd. to Gen. List, Feb. 10th.

Flying Officers (Observers).—The rank of temp. Lt. H. A. Chuter, R. Fus., is as now described, and not as in the "Gazette" of Feb 15th. Temp. Lt. J. Thompson, Gen. List, Jan. 20th, seny. from Oct. 28th, 1916; temp. Sec Lt. R. Gregory, Machine Gun Corps, and to be transfd. to Gen. List, Nov. 15th, 1916, seny. from Dec. 19th, 1915; temp. Sec. Lt. L. G. Hall, attd. North'n R., and to be transfd. to Gen. List. Feb. 5th, seny. from Oct. 2nd, 1916; Sec. Lt. E. G. W. Bisset, Gord. Highrs., T.F., and to be secd., Jan. 7th, seny. from Oct. 15th, 1916; temp. Sec. Lt. (temp. Lt.) C. A. F. Brown, Gen. List, Dec. 26th, 1916, seny. from Oct. 20th, 1916; temp. Lt. W. E. Gower, attd. Notts. and Derby R., and to be transfd. to Gen. List, Jan. 7th, seny. from Nov. 16th, 1916; temp. Sec. Lt. N. S. Dougall, Linc. R., and to be transfd. to Gen. List, Jan. 19th, seny. from Nov. 30th, 1916. Lt. A. W. Nasmyth, Can. Gen. List; Sec. Lt. N. C. Denison, Yorks L.I., T.F., and to be secd.; Sec. Lt. V. O. Lonsdale, R.A., and to be secd.; temp. Sec. Lt. (on prob.) H. G. Downing, Gen. List, Feb. 4th, seny. from Dec. 2nd, 1916; temp. Sec Lt. (on prob.) F. Tapping, Gen. List, Feb. 5th, seny. from Dec 2nd, 1916; temp. Sec. Lt. (on prob.) L. C. F. Clutterbuck, Gen. List, Jan. 3rd, seny. from Dec. 31st, 1916.

Equipt. Officers, 2nd Cl.—From the 3rd Cl.—Sec. Lt. F. G. Brown, R.F.A., T.F., and to be temp. Lt. while so empld., Feb. 1st; Lt. W. J. Hewitt, Spec. Res., Feb. 8th.

3rd Cl.—Sec. Lt. R. W. Morison, Yeo., T.F., and to be secd., Dec. 7th, 1916; Sec. Lt. F. A. Woolfe, Spec. Res., Dec. 27th, 1916; Sec. Lt. J. H. Cotton, Spec Res., Dec. 28th, 1916; Sec. Lt. T. F. Tomlinson, Suff. R., T.F., and to be secd., Dec. 31st, 1916; temp. Capt. L. M. Lilley, A.S.C., and to be transfd. to Gen. List, Jan. 1st; Sec. Lt. E. S. Crabtree, Spec. Res., Jan. 2nd; Sec. Lt. J. C. Murray, Spec. Res., Jan. 4th; Sec. Lt. J. H. F. Pilling, Spec. Res., Jan. 12th; temp. Lt. H. J. Gilbert, A. Ord. Dept., and to be transfd. to Gen. List, Jan. 22nd; Sec. Lt. F. Gilbert, D. of Corn. L.I., T.F., and to be secd., Jan. 24th; Sec. Lt. (temp. Lt.) S. J. Waters, R.F.C., T.F., and to be secd., Jan. 26th; Sec. Lt. W. N. Spragg, Spec. Res; temp. Sec. Lt. (on prob.) A. G. D. West, Gen. List; Sec. Lt. E. N. L. White, Spec. Res., Feb. 2nd; temp. Sec. Lt. A. F. Elliott, Gen. List; temp. Sec. Lt. J. G. Harriott, Gen. List, Feb. 4th.

School of Instruction.—Instr. (graded as a Sqdn. Comdr.).—Capt. J. V. Steel, R.A., a Flt. Comdr., and to be temp. Maj. whilst so empld., Jan. 11th. (Substituted for the notification in the "Gazette" of Jan. 30th.)

A.S.C.—Sec. Lt. J. T. Whittaker is secd. for service with R.F.C., June 4th, 1916.

M.G.C.—Sec. Lt. P. B. Harris (R.F.C., Spec. Res.), to be Equipt. Officer, and to be actg. Capt. while so empld., Jan. 10th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—H. D. Williams, from Lt., New Zealand Forces, to be Lt., July 15th, 1916.

The notification in "Gazette" of Dec. 19th, 1916, of appt. of Sec. Lt. (on prob.) M. Thompson, is cancelled.

The following Sec. Lts. (on prob.) are confirmed in their rank :—J. H. Muir, A. H. Bates, T. J. Owen, E. C. Fowler, H. A. C. Parker.

To be Sec. Lts. (on prob.) :—W. Duff, Feb. 9th; W. F. Thrutchley, Feb. 11th; S. Beeby. Feb. 12th; R. Neilson, Feb. 13th.

TERRITORIAL FORCE.—Yeomanry.—Capt. T. W. Best is secd. for duty with R.F.C., Feb. 15th.

R.F.A.—Lt. R. N. Wolton is secd. for duty with R.F.C., Feb. 10th; Sec. Lt. J. L. Payton is secd. for duty with R.F.C., Feb. 10th.

Suff. R.—Sec. Lt. T. F. Tomlinson is secd. for duty with R.F.C., Dec. 31st, 1916.

Corn. L.I.—Sec. Lt. F. Gilbert is secd. for duty with R.F.C., Jan. 24th.

North'n R.—Lt. A. G. A. Hodges is secd. for duty with R.F.C., Jan. 2nd.

Midd'x R.—Sec. Lt. H. E. Darrington is secd. for duty with R.F.C., Feb. 12th.

* * *

From the "London Gazette" Supplement, Feb. 28th, 1917.

War Office, Feb. 28th.

TERRITORIAL FORCE.—R.E.—The following announcement is substituted for that which appeared in the "Gazette" of Feb. 2nd, under heading, "Welsh Divisional Engineers" :—Sec. Lt. J. E. Taylor is secd. for duty with the R.F.C., Jan. 13th.

Infantry.—R. Sussex R.—Qr.-Mr. and Hon. Lt. D. A. Childs is secd. for duty with the R.F.C., Feb. 14th.

Essex R.—Lt. (temp. Capt.) L. R. O. Conway is secd. for duty with the R.F.C., Feb. 1st.

Midd'x R.—Lt. (temp. Capt.) A. R. Williamson is secd. for duty with the R.F.C., Nov. 13th, 1916.

* * *

From the "London Gazette" Supplement, March 1st, 1917.

War Office, March 1st.

REGULAR FORCES. — Establishments. — R.F.C. — Wing Comdrs.—From Sqdn. Comdrs., and to be temp. Lt.-Cols. whilst so empld. :—Capt. (temp. Maj.) R. Loraine, M.C., Spec. Res., Feb. 13th; Capt. (temp. Maj.) G. I. Carmichael, D.S.O., R.A., Feb. 18th.

Sqdn. Comdrs.—From Flt. Comdrs. :—Lt. (temp. Capt.) J. H. Herring, M.C., Spec. Res., and to be temp. Maj. whilst so empld., Jan. 1st; Maj. H. S. Walker, Ches. R., Feb. 18th.

Flt. Comdrs.—From Flying Officers :—Temp. Sec. Lt. (temp. Lt.) L. E. Eeman, Gen. List, and to be temp. Capt. whilst so empld., Oct. 7, 1916; Lt. (temp. Capt.) H. W. G. Jones, Welsh R., T.F., Feb 10th,

Lt. (temp. Capt.) M. S. Stewart, A.S.C., relinquishes his temp. rank on ceasing to be empld. as a Flt. Comdr., Dec. 12th, 1916.

Flying Officers.—Lt. (temp. Capt.) C. B. J. Lancaster, High. L.I., T.F., and to be secd., Jan. 25th; Lt A. Maxwell, R. Scots, and to be secd., Jan. 26th; temp. Lt. A. G. Fisher, A.S.C., and to be transfd. to Gen. List, Feb. 1st; Lt. R. N. Wolton, R.F.A., T.F., and to be secd.; temp. Sec. Lt. R. N. Treadwell, Essex R., and to be transfd. to Gen. List; Sec. Lt. J. L. Payton, R.F.A., T.F., and to be secd.; temp. Sec. Lt. R. A. George, attd. Gordon Highrs., and to be transfd. to Gen. List; Sec. Lt (on prob.) J. G. Thompson, Spec. Res., Feb. 10th; Sec. Lt. H. E. Darrington, Midd'x R., T.F., and to be secd., Feb. 12th.

Flying Officers (Observers).—Temp Sec. Lt. C. G. Riley, R. Fus., and to be transfd. to Gen. List, Nov 15th, 1916, seny. from April 21st, 1916; Sec. Lt. J. C. D. Wordsworth, Durh. L.I., T.F., and to be secd., Feb. 13th, seny. from Oct. 3rd, 1916; Sec. Lt. A. L. Smith, Seaf. Highrs., T.F., and to be secd., Feb 7th, seny. from Oct. 15th, 1916; temp. Sec. Lt. G. W. Doolittle, R.W. Fus., and to be transfd. to Gen. List, Feb. 6th; seny. from Oct. 15th, 1916. Temp. Sec. Lt. E. G. C. Quilter, Gen. List, seny. from Oct 20th, 1916; temp. Sec. Lt. (on prob.) H. C. Reade, Gen. List, seny. from Nov. 3rd, 1916, Feb. 10th. Temp. Sec. Lt. G. O. McEntee, R. Fus., and to be transfd. to Gen. List, seny. from Nov. 6th, 1916; Sec. Lt. F. O'Sullivan, N. Staff. R., T.F., and to be secd., seny. from Nov. 7th, 1916; Feb. 8th. Temp. Sec. Lt. (on prob.) A. G. S. de Ross, Gen. List, seny. from Nov. 24th, 1916; temp. Lt. C. H. Morris, R.W. Fus., and to be transfd. to Gen. List, seny. from Dec. 2nd, 1916; Feb. 12th. Temp. Sec. Lt. D. C. Wollen, High. L.I., and to be transfd. to Gen. List, Feb. 6th, seny. from Dec. 4th, 1916; temp. Sec. Lt. J. M. Musson, British W. Indies R., and to be transfd. to Gen. List, Feb. 13th, with seny. from Dec. 7th, 1916. Temp. Lt. P. Smith, R.E.; temp. Sec. Lt. (on prob.) W. K. Crewe, Gen. List, Feb. 13th, seny. from Dec. 8th, 1916; temp. Sec. Lt. (on prob.) W. A. Winter, Gen. List, Feb. 13th, seny. from Dec. 17th, 1916; Lt. B. M. Morris, Can. Engrs., Feb. 12th, seny. from Jan. 1st; temp. Sec. Lt. (on prob.) D. H. Simmons, Gen. List, Feb. 13th, seny. from Jan. 2nd.

Balloon Co. Comdr. (graded as a Flt. Comdr.).—Sec. Lt. (temp. Lt.) W. Brass, Yeo., T.F., from a Balloon Officer, and to be temp. Capt. whilst so empld., Feb. 10th.

Equipt. Officers, 3rd Cl.—Dec. 5th, 1916.—Temp. Sec. Lt. (on prob.) J. W. Askham, Gen. List; temp. Sec. Lt. (on prob.) R. G. Shackel, Gen. List; temp. Sec. Lt. (on prob.) J. G. Plester, Gen. List, Dec. 6th, 1916; Lt. H. A. Wilsdon, Oxf. and Bucks L.I., T.F., from Mach. Gun Corps, Feb. 13th.

A.S.C.—Cdt. to be temp. Sec. Lt. :—T. A. J. Guyatt (late Sec. Lt., R.F.C.), Feb. 12th.

Memoranda.—Cdts. to be temp. Sec. Lts. (on prob.) for duty with R.F.C. :—O. F. Clarke, Feb. 12th; G. N. Cockerell, C. A. Christmas, G. Baker, Feb. 19th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Lt. G. O. Hayne is placed on ret.

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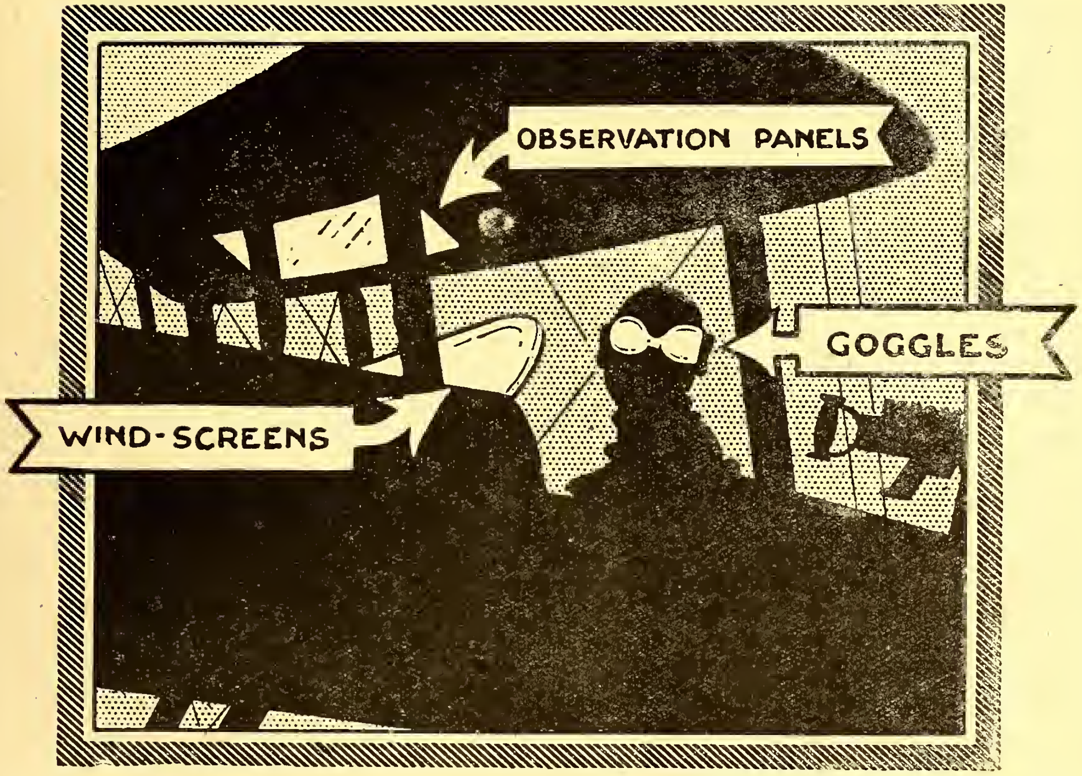

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list on account of ill-health contracted on active service, March 2nd.

Sec. Lts. to be Lts.:—A. E. Thorne, P. Tremlett, C. L. H. Hicks, (temp. Lt.) R. T. Lattey, (temp. Lt.) S. Turner, N. C. Millman, W. C. Gage, (temp. Lt.) L. J. Stuart, A. J. Mayo, (temp. Capt.) P. Pralle, W. O. Phillips, E. Duveen, (temp. Capt. H. P. Boot, (temp. Lt.) J. D. Troup, (temp. Lt.) A. J. Rickie, J. Armes, E. W. Vaughan, (temp. Capt.) G. F. Underwood, Jan. 1st.

TERRITORIAL FORCE. — R.F.C.—Lt. (temp. Capt.) H. Grinstead to be temp. Maj.; Sec. Lt. (temp. Lt.) H. D. Teage to be temp. Capt., Jan. 1st.

INFANTRY.—LOND. R.—Sec. Lt. N. T. Croft is secd. for duty with R.F.C., Jan. 27th.

* * *

From the "London Gazette" Supplement, March 1st, 1917.

ADMIRALTY, March 1st.

The following Decoration has been conferred by the King of Roumania:—

ORDER OF MIHAI VITEAZUL.

Third Class.—Flt. Lt. Arthur F. F. Jacob, R.N.A.S.

The King has given unrestricted permission to the officer concerned to wear the Decoration in question.

* * *

From the "London Gazette," March 2nd, 1917.

ADMIRALTY, Feb. 27th.

R.N.A.S.—Temp. Prob. Flt. Sub-Lts. to be temp. Flt. Sub-Lts. —W. E. C. Parry, Aug. 19th, 1915; C. K. Studd, Oct. 17th, 1915; W. F. Cleghorn, Dec. 16th, 1915; H. S. Broad, W. B. Foster, April 30th, 1916; R. B. Freeland, May 25th, 1916; M. O. Fairhurst, K. B. Preston, June 25th, 1916; A. B. Ellwood, W. E. Foster, F. E. Banbury, June 28th, 1916; T. W. S. Harris, P. Wood, D. L. Wilson, July 2nd, 1916; E. D. Roach, H. L. Smith, July 5th, 1916; E. B. Drake, F. I. Jacks, E. J. K. Buckley, A. L. Taylor, July 16th, 1916; E. O. A. Andrews, July 18th, 1916; E. Dickson, T. A. Gladstone, July 30th, 1916; R. V. Knight, Aug. 6th, 1916; T. K. Thyne, Aug. 13th, 1916; A. McB. Walton, Aug. 18th, 1916; G. H. G. Smyth, Aug. 25th, 1916; A. R. Knight, Aug. 26th, 1916; H. L. Crowe, Sept. 28th, 1916.

WAR OFFICE, March 2nd.

REGULAR FORCES. — ESTABLISHMENTS. — R.F.C. — Flt. Comdr.—Capt. G. Adams, S. Lan. R., from an Equipment Officer, 1st Cl., Jan. 16th.

Flying Officers.—Temp. Sec. Lt. A. A. N. Pentland, Gen. List, Jan. 20th; Temp. Capt. H. G. Hutchinson, Gen. List, Feb. 9th.

Balloon Co. Comdr.—(Graded as a Sqdn. Comdr.).—Lt. (temp. Capt.) C. H. Stringer, Lrs., from a Co. Comdr. (graded as a Flt. Comdr.), and to be temp. Major whilst so employed, Dec. 5th, 1916.

Balloon Officers.—Temp. Sec. Lt. R. Temple, Gen List, Nov. 7th, 1916; Sec. Lt. (on prob.) G. L. Gamlen, R.G.A., Spec. Res., Nov. 21st, 1916; Lt. A. G. A. Hodges, North'n R., T.F., and to be secd.; Temp. Sec. Lt. A. C. A. Scates, R. Suss. R., and to be transfd. to Gen. List, Jan. 2nd.

Adjt.—Temp. Lt. H. G. Waterall, Gen. List, from an Equipment Officer, 3rd Cl., Jan. 31st.

Equipment Officers, 3rd Cl.—Temp. Sec. Lt. S. Purkiss-Ginn, Essex R.; Temp. Sec. Lt. (on prob.) L. C. Row, Gen. List; Sec. Lt. (on prob.) P. W. Renshaw, Spec. Res.; Sec Lt. (on prob.) W. A. Sievwright, Spec. Res.; Sec. Lt. (on prob.) H. Smith, Spec. Res.; Sec. Lt. (on prob.) D. Rintoul, Spec. Res.; Qrmr. and Hon. Lt. R. W. Monro, R.A.M.C., T.F.; Sec. Lt. (on prob.) J. Y. Watson, Spec. Res.; Sec. Lt. (on prob.) J. C. F. Williams, Spec. Res.; Sec. Lt. (on prob.) S. L. Amor, Spec. Res.; Temp. Sec. Lt. J. A. Atkinson, Gen. List; Temp. Sec. Lt. A. D. Birkhead, Gen. List; Sec. Lt. (on prob.) D. H. Blaikie, Spec. Res.; Sec. Lt. (on prob.) F. E. Bayley, Spec. Res.; Temp. Sec. Lt. D. Barron, Gen. List; Qrmr. and Hon. Lt. D. A. Childs, R. Suss. R., T.F.; Temp. Sec. Lt. F. O. Burnley, W. Yorks R., and to be transfd. to Gen. List; Sec. Lt. (on prob.) E. W. Brooks, Spec. Res.; Sec. Lt. (on prob.) R. H. Butler, Spec. Res.; Sec. Lt. (on prob.) A. T. Crook, Spec. Res.; Sec. Lt. (on prob.) H. L. Dawson, Spec. Res., Feb. 14th.

CENTRAL FLYING SCHOOL.—Instr. in Theory and Construction.— Capt. H. C. Barber, Spec. Res., an Equipment Officer, 1st Cl., vice Capt. G. Adams, S. Lan. R., Jan. 16th.

SCHOOLS OF MIL. AERONAUTICS.—Inspr. of Tech. Training.— (Graded as a Sqdn. Comdr.).—Temp. Major A. E. G. MacCallum, Gen. List, from a Chief Instr. (graded as a Park Commander), Feb. 1st.

Chief Instr.—(Graded as a Sqdn. Comdr.).—Lt. (temp. Capt.) G. S. M. Ashby, R.A., from a Flt. Comdr., and to be temp. Major whilst so employed, vice temp. Major A. E. G. MacCallum, Gen. List, Feb. 1st.

MEMORANDA.—Temp. Capt. H. G. Hutchinson, from R. Mar., to be temp. Capt. on Gen. List for duty with R.F.C., Feb. 9th.

Undermentioned to be temp. Lts. on Gen. List for duty with R.F.C.—Temp. Lt. E. L. Burrell, from R. Mar., Dec. 28th, 1916, but seny. from Oct. 19th, 1916; Lt. A. R. Rattray, from R. Ind. Marine, Feb. 15th.

Undermentioned, from R.F.C., to be Sec. Lts. for duty with R.F.C.—Sgt.-Major D. Mitchell, Actg. Sgt.-Major A. W. Turner, Actg. Sgt.-Major F. Farrer, March 3rd.

Sec. Lt. (on prob.) S. G. Dowsett, from R.F.C., Spec. Res., is transfd. to Gen. List, for duty with R.F.C., Aug. 7th, 1916.

To be temp. Sec. Lts. (on prob.) for duty with R.F.C.:—Cdt. W. L. Dawson, from an Officer Cdt. Bn., Nov. 22nd, 1916; C. P. Vivian, Jan. 27th; Cdt. W. H. Dallow, Cdt. N. A. C. Runnels-Moss, Cdt. F. B. Stradling, Jan. 27th.

TERRITORIAL FORCE.—R.F.C.—Sec. Lt. (temp. Lt.) A. H. Lister to be temp. Capt., Jan. 1st, 1917.

* * *

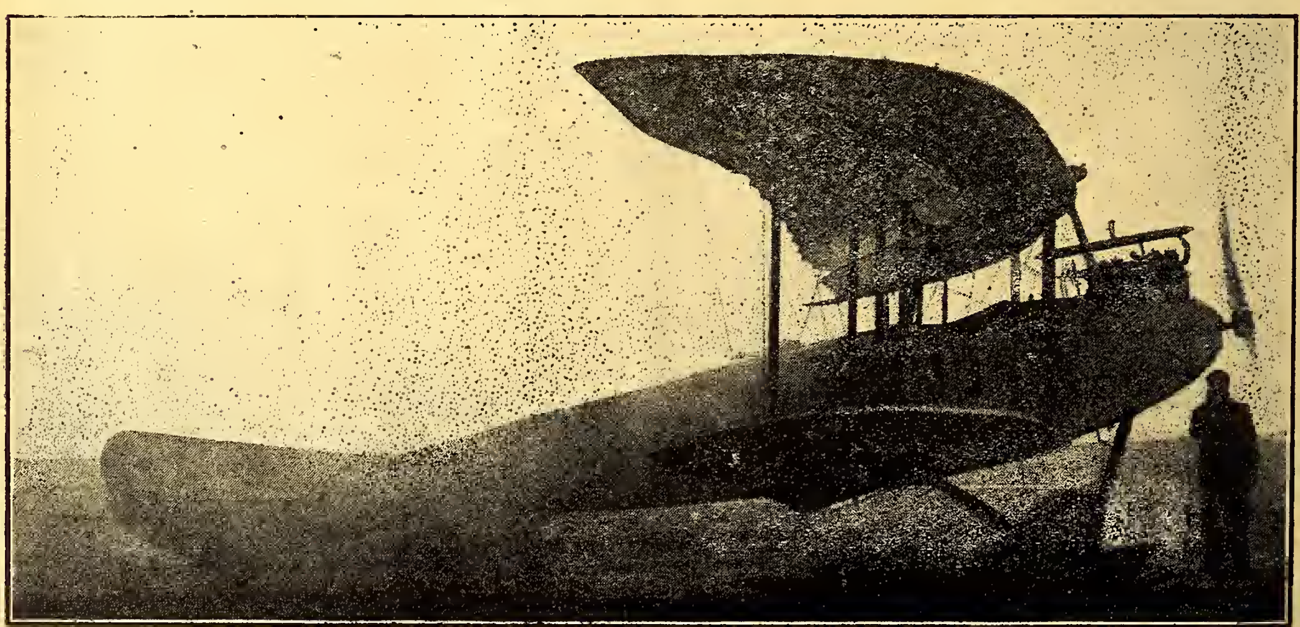
From the "London Gazette" Supplement, March 3rd, 1917.

WAR OFFICE, March 3rd.

REGULAR FORCES. — ESTABLISHMENTS. — R.F.C. — Sqdn. Comdr.—Capt. A. W. Tedder, Dorset R., from a Flt. Comdr., and to be temp. Maj while so empld., Jan. 1st.

Flt. Comdrs.—From Flying Officers, and to be temp. Capts. while so empld.:—Sec. Lt. (temp. Lt.) L. W. McArthur, M.C., H.A.C., T.F., Jan. 30th. Sec. Lt. C. Gordon-Davis, N. Staff. R., Feb. 14th. Sec. Lt. (temp. Capt.) J. M. Robb, North'd Fus., T.F., from a Flying Officer. From Flying Officers, and to be temp. Capts. while so empld.:—Lt. G. J. Scott, R.F.A., T.F., Sec. Lt. C. J. Q. Brand, Spec. Res., Feb. 15th.

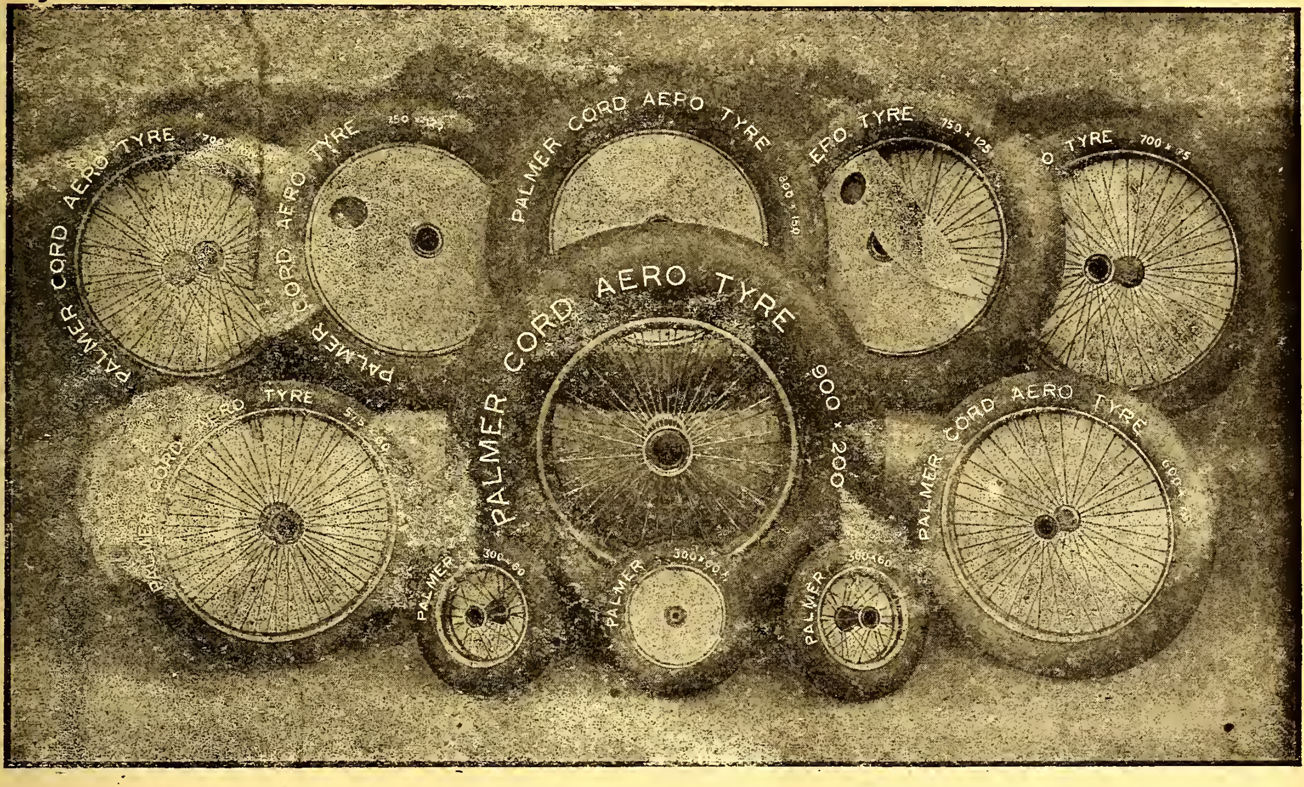
(*Continued on page 632*)



A side view of the D.F.W. biplane, illustrated on a preceding page, the work of the Deutsche Flugzeug Werke of Leipzig.

PALMER

CORD TYRES and WHEELS For AEROPLANES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AERO TYRE 750 × 125
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PALMER CORD AERO TYRE 900 × 200
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Tyre Sizes	Wheel No.	Hub		Track Line	Tyre Sizes	Wheel No.	Hub		Track Lin	Tyre Sizes	Wheel No.	Hub		Track Line
		Length	Bore				Length	Bore				Length	Bore	
		m/m	m/m	m m			m m	m m	m/m			m m	m/m	m/m
300×60	16	111.12	25.4	Central	700×75	9	178.	44.45	132/46	750×125	18	178.	44.45	132/46
,,	17	72.39	12.7	Central	,,	20	178.	38.09	132/46	,,	26	150.	40.	Central
					,,	75	178.	31.75	132/46	,,	33	150.	38.09	Central
450×60	30	89,	31.75	Central	,,	80	178.	44.45	132/46	,,	38	178.	38.09	132/46
										,,	66	178.	38.89	132/46
575×60	14	150.	38.09	104/46	700×100	2	185.	55.	135/50	800×150	8	185.	55.	135/50
,,	21	160.	28.	Central	,,	4	185.	55.	Central	,,	10	185.	55.	Central
,,	34	150.	31.75	104/46	,,	18	178.	44.45	132/46	,,	36	185.	55.	135/50
					,,	26	150.	40.	Central	,,	40	185.	60.32	135/50
600×75	14	150.	38.09	104/46	,,	33	150.	38.09	Central	900×200	42	185.	60.32	125/60
,,	21	160.	28.	Central	,,	38	178.	38.09	132/46	,,	47	185.	55.	125/60
,,	34	150.	31.75	104/46	,,	66	178.	38.89	132/46					
					750×125	2	185.	55.	135/50	1100×200	52	185.	55.	116/69
					,,	4	185.	55.	Central	,,	57	185.	55.	Central

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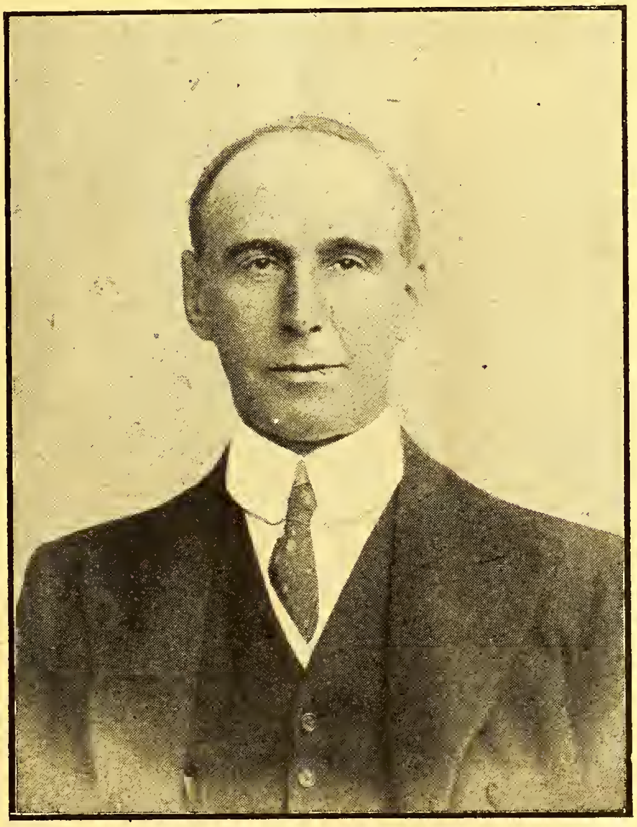
The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

VI.—J. SAMUEL WHITE AND CO., LTD.

The entry of this world-famous firm of naval constructors—established some 150 years ago—into the aircraft industry was due to the foresight of the late Mr. Carnt, then managing director. Realising from his own maritime experience the part that the seaplane was destined to play in naval warfare, he decided that the Company might justifiably build aircraft as well as warships of various sorts, and to the great works at East Cowes was forthwith added an Aviation Department accordingly.



Mr. Howard T. Wright.

This was placed under the control, in January, 1913, of Mr. Howard Theophilus Wright—in every way an admirable choice. In three months he had brought out the first "Wight" machine, a pusher seaplane fitted with a 160-h.p. Gnome motor. It proved a success, and was eventually taken over by the Admiralty. Mr. Winston Churchill visited the works and witnessed a trial flight; and though at the time he remarked that the machine must be regarded as an experiment, the Admiralty eventually placed orders for more. A similar machine, it may be said, was also supplied to Germany, and to this day the seaplanes which the Germans have built for themselves are fitted with the type of float used in the early "Wight" machines.

Originally, the Aviation Department of Messrs. J. Samuel White and Co. was engaged on R.N.A.S. work exclusively, and in all has produced over a score of different types of seaplane, but at a later date new buildings were erected in order that repetition work might be undertaken for the R. F. C. The requirements of the Defence of the Realm Act preclude further reference to the firm's productions. Were the case otherwise one might describe and illustrate some particularly interesting machines.

But if the war has made it impossible for one to descant on the Wight seaplanes, the career of Mr. Howard T. Wright cannot be allowed to escape notice, for it is one of the most remarkable in the industry. In one respect it is unique. Mr. Wright was the first man in England to have a factory building aeroplanes—and selling them! So far back as 1906 he produced, and sold for no less a sum than £2,500, an aeroplane for Signor Caproni, an Italian since himself famous as a constructor.

When the date is borne in mind, it is not surprising that Mr. Wright should describe this "prehistoric" product as "a quaint machine." It was built entirely of steel tubing, and was fitted with the first Esnault Pelterie motor that was ever made, driving two propellers of 26 ft. diameter.

How, it may be wondered, did Mr. Howard Wright come to get the order? It came about in this way: He had been associated with the Maxim Company, and when that went into liquidation he bought back his own goodwill. A letter addressed to the defunct firm by Signor Caproni was passed on to Mr. Wright, and correspondence was thus opened up. Signor Caproni sent over a rough design for an aeroplane, and asked for a tender. Mr. Wright studied the design during his summer holidays, and decided that he could undertake the work; his terms having been accepted, he set about building the machine, and had it completed six months before the first Olympia Aero Show.

Such was the genesis of Mr. Howard Wright's long career as an aeroplane constructor. He was soon at work on another machine, and everyone who visited the first Olympia Aero Show will remember the imposing appearance which was presented by the Wright biplane amid a collection composed mostly of models and freaks.

This machine was built to the order of Mr. Seton Karr. It had planes of 55 ft. span, *cloissonné*, and was of steel construction, with spars and ribs of mahogany. There was a single running wheel, with telescopic struts, and a small wheel to each wing tip. The motor was an ordinary vertical 16-h.p. Métallurgique.

The fact must not be forgotten that this machine was designed and built by Mr. Wright before Henri Farman had learned to fly or the Wright Brothers had come to Europe. I remember wondering whether it would ever fly, but Mr. Wright tells me that it was taken down to Rye by Mr. Seton Karr, who succeeded in leaving the ground and making two short flights. In the first instance, by the way, it had been sent to Mr. Pemberton-Billing's aerodrome at Fambridge, but Mr. Karr preferred a larger space for the making of his first attempts.

Mr. H. C. Barber was the next patron for whom Mr. Wright built to order. Mr. Barber had several machines, including the first Valkyrie.

Then came the little Avis monoplane, built for the Scottish Aeroplane Syndicate. It was flown by the Hon. Alan Boyle and was the first monoplane to put up a cross-country flight in Great Britain. It also established a duration record at the Wolverhampton Aviation meeting. After a whole week's trials, it remained in the air for 3 minutes 52 seconds—and, for this paralysing achievement, gained a prize of £500!

REAL FLYING.

Of the E.N.V. biplane, which followed, quite a number were built, and were most successful. We have already seen, in fact, in a previous article, how Mr. T. O. M. Sopwith scored his early successes on his Howard Wright, including the winning of the de Forest Cup by a flight from Eastchurch to Belgium.

Yet another was the Ornis monoplane, which Mr. Wright built for another syndicate. All this time, in fact, his was the only aeroplane factory near London, and most people who wanted to fly on a British-built machine came to him accordingly. Among others who made noteworthy flights on Howard Wright machines were Mr. Robert Loraine and Captain Maitland.

In all, Mr. Howard Wright produced the creditable number of thirty-one machines at his works at Battersea, and while there he designed and built practically every known type.

The works were in a large railway arch, about 50 ft. by 150 ft., and his staff numbered about 25 men.

Also, it should be added that Mr. Wright built the first machine at Brooklands, and the first at Larkhill, Salisbury Plain, occupying the first aeroplane shed to be erected in each case.

COMMERCIAL SUCCESS.

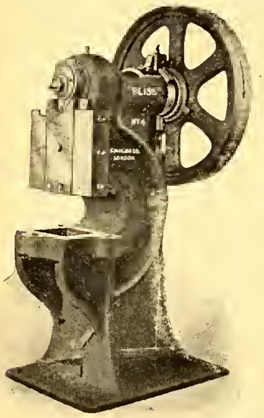
In yet another respect, perhaps, he can lay claim to a unique experience, where pioneers are concerned. He managed to make the business pay, and came out of it with just the amount of his original capital. It was not until October, 1912, however, that he found time to qualify as a pilot, and, curiously enough, he took lessons from Mr. Sopwith, on a Henri Farman biplane.

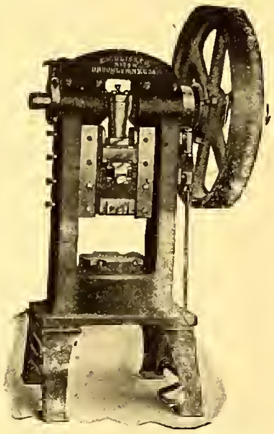
When, therefore, he joined the firm of J. Samuel White and Co. soon afterwards, they secured the services of a man who had not only proved his sound business qualities, had the longest record of designing and building of any man in England, but was also a flier into the bargain.

PRESS WORK IN AEROPLANE CONSTRUCTION.

When one wanders around the average aeroplane works it is often a little surprising to notice the large amount of work which is done by hand which might very well be carried out with far greater expedition on suitably constructed machines.

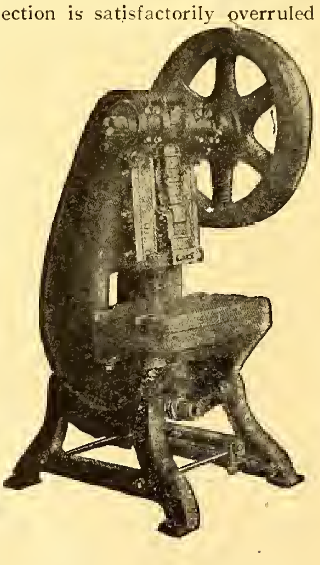
A very large proportion of this manual work which may easily be avoided is in connection with sheet metal. One frequently sees a patient mechanic slowly and laboriously turning out sheet metal blanks with the aid of a drilling machine, a nibbling machine, and a couple of files, when, with the aid of a power press, hundreds of the same article could be turned out in the time it takes him to produce one.





It seems quite clear that the installation of properly constructed presses would save an enormous amount of time, with a resultant increase in the rate of production.

One of the chief objections which is raised to the use of power presses is the dearth of highly skilled mechanics who can make the necessary dies. But this objection is satisfactorily overruled when it is known that most of the manufacturers of these machines are experienced at manufacturing dies for their customers.



The E. W. Bliss Company claim to be the largest manufacturers of power presses in the world. Their principal works are at Brooklyn, New York, and they have other large works in Paris and London. At their premises in Pocock Street, Blackfriars Road, S.E., the chief business consists of the making of small presses, special machinery, and dies.

The illustrations show three presses which are specially adaptable to aircraft work; namely, No. 1a "Bliss" Inclinable Power Press; No. 4a "Stiles" Punching Press, and No. 55a Straight-Sided Press.

The output of the Bliss machines is adaptable to every form of work, and inquiries are invited from aircraft manufacturers regarding machines for special jobs. A speciality is made of producing dies to suit individual requirements, and very prompt deliveries can be given for this class of work.

Inquiries of all kinds should be addressed to the London house at Pocock Street, Blackfriars Road, S.E.

PRELIMINARY INSTRUCTION IN AERONAUTICAL ENGINEERING.

Not infrequently one receives inquiries from youngsters of 16 or 17, who are anxious to obtain some practical experience in aircraft work while awaiting the attainment of the mature age of 18, when they become eligible for appointment to the Flying Services. As a rule their only mechanical training has been that acquired in the workshop of a public school, which is naturally not very great.

Under existing conditions it is rather difficult for aspiring aviators to procure exactly the kind of instruction they require. The time available is not sufficient to undergo a regular apprenticeship, and in most instances the only alternative is to accept the position of shop-boy and to undertake any rough work which may be given them. The chief drawback to this arrangement is, however, that very little can be learnt in such a capacity, because the youth is almost invariably attached to one department, and very often to one machine, and any curiosity he may evince in other sections is likely to be discouraged.

Side by side with this lack of knowledge on the part of prospective Service aviators there is a pretty general feeling, both in aeroplane and aero-engine factories, that a good deal of the mechanical trouble which occurs to the machines on service is due to the ignorance of the individual pilot in both Services of the peculiarities and limitations of the different aeroplanes and engines. Aero-engines in particular are peculiarly capricious and need individual treatment, for that which is one engine's food is another engine's poison.

The question, therefore, arises as to whether it would be worth the while of aircraft constructors of repute to take a limited number of prospective probationary Flight Officers and R.F.C. cadets and give them a course of practical instruction in the Works, as to the best treatment of their productions.

Provided the number accepted was not too great, it does not seem that a great deal of inconvenience would be occasioned thereby, and it seems quite probable that it would be very well worth a firm's while to adopt the scheme in order to inculcate a knowledge of the manners and customs of its aeroplanes or engines into a number of the people who would ultimately use them, and who would possibly be in a position to influence their continued use to the good or to the bad according to the degree of success or failure they experienced.

For the useful adoption of such a scheme it would be necessary to make some arrangements with the Air Department at the Admiralty, and with the Department of Military Aeronautics to interview and provisionally accept candidates for these studentships (for lack of a better name), as it would be quite useless to take on youths who were unlikely to be passed ultimately, on physical or social grounds, for appointment to one or other of the Flying Services.

In these days the great majority of pilots are trained by the Admiralty and War Office at the Government's expense, and the outlay of £100 or so on the acquisition of a civilian pilot's certificate is not so common as it once was. It seems possible, therefore, that the parents of aspirants to the Flying Services would be prepared to pay a similar fee for a reasonably intimate course of practical instruction at an aircraft-works as a prelude to applying for an appointment.—W.L.W.

THE SOUL OF THE MOTOR.

It is now officially announced that all the British Service aviators who have destroyed Zeppelins used British magnetos designed in Britain and made by British labour in all-British factories. The British magneto trade has been created by the war. British magnetos were previously looked upon with even less favour than British waiters. It is to be hoped, at any rate, that the British waiter will have become as efficient as the British magneto is now by the time war is over.

Anyhow, British magnetos are doing very good work in the air at present, and one hopes that we have done with Hun magnetos for ever.

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Further Notes on the 1916-17 Albatros Biplane.

The Type C.III.

The following further notes on the Type C.III Albatros biplane are taken from "L'Aérophile," with due acknowledgments to MM. Georges Besançon and Jean Lagorgette :—

WINGS.—Shape and arrangement.—Their incidence varies from 6 deg. (otherwise 178 mm. in the lower wings and 188.5 mm. in the upper wings, which have a bigger chord) near the fuselage, to 2.6 deg. or 1.3 deg. at the extremities of the upper wings, left and right respectively—the difference being presumably to compensate for propeller torque.

The wings are therefore slightly on the twist, as if warped, and the angles of the ribs vary in section right along the planes. (Sketches of the ribs appeared in "Aeronautical Engineering" last week.)

The wings form an extremely open "V," or dihedral, about 2 deg. from the horizontal, otherwise 156 mm. up to the top of the external interplane struts, or 170 mm. to the top of the upper outer ribs, measured from the corresponding point in the centre of the wings.

They are not swept-back, but, contrary to the custom in the "general purpose" German biplanes, are like those of the latest German fighting machines, a type which was borrowed from the French.

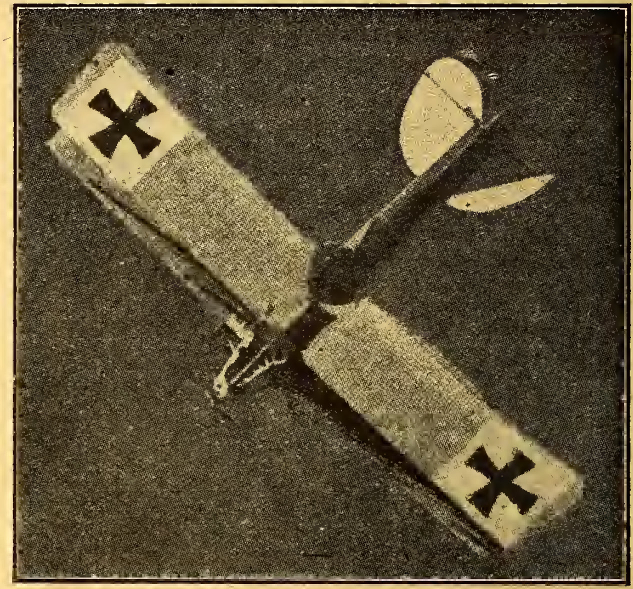
The lower wings are almost equal in span and chord (11.15 m. by 1.7 m.) to the upper wings (11.75 by 1.81 m.). The difference in chord, although trifling, was inspired by Allied machines, is new with the Germans, and not yet common.

The leading edges not being staggered, the difference of chord is displayed in the interval between the spars (0.8 m. and 0.7 m.), so that the rear struts, instead of being vertical, diverge from bottom to top from the front struts, and the upper trailing edge at the ordinary flying angle is behind the lower trailing edge.

As in preceding types, the ailerons of C.III, which are found only in the upper wings, and are markedly "washed out," do not extend to the rear main spar, but only to a third supplementary spar placed to the rear of it. They sweep backwards at an angle, past the line of the trailing edge. As in the reconnaissance biplane, they are not so long (2.45 m. by 0.55 m., enlarging to 0.7 m.) as in the older Albatros machines, and even less than in the recent D.1, where their total length is more than half the span of the machine.

Structure.—The attachments consist of screwed ferrules with adjustable milled nuts, with a spring locking key (illustrated in "Aeronautical Engineering" last week). In the upper wings they have the peculiarity that they are not attached on the axis of the main spars, but half the diameter of the spar above it.

The front attachments are fitted to a transverse tube, which is embodied in the cabane, and the rear to a simple flat at the summit of the cabane.



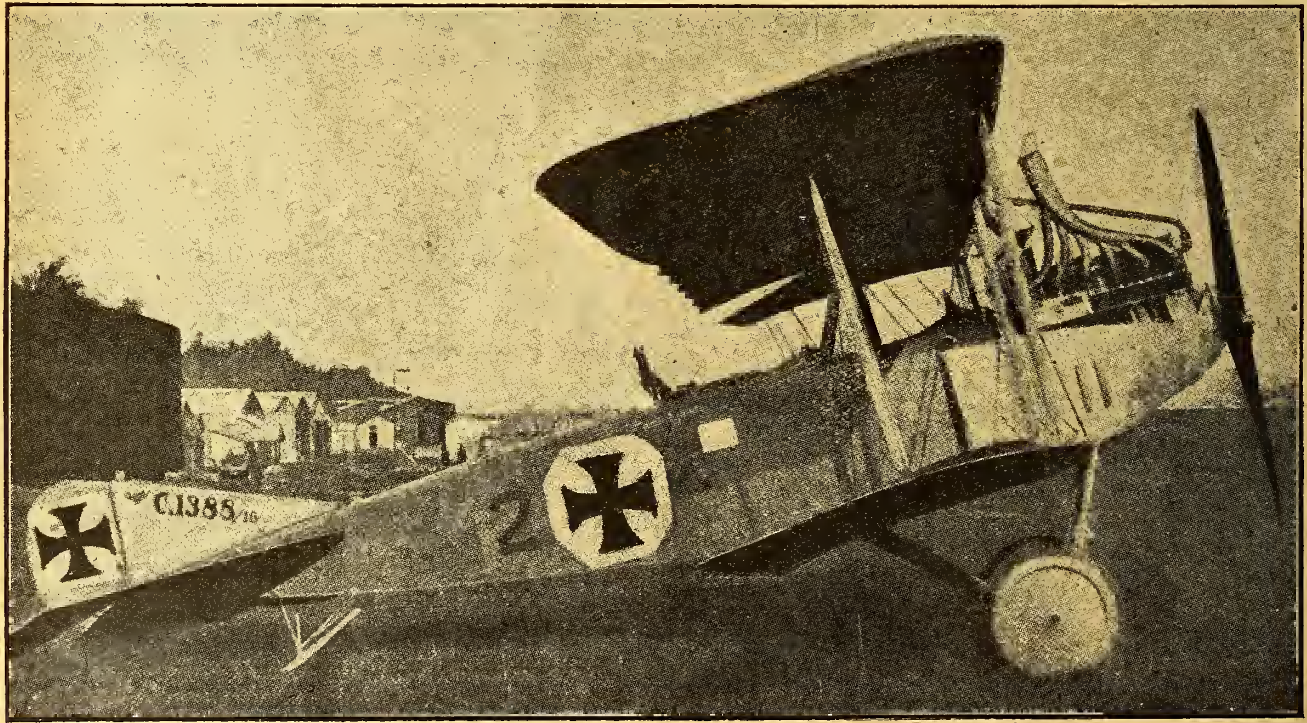
Plan View of a 1916-17 Albatros, photographed by a French Military Pilot on active service, and reproduced from "L'Aérophile."

As in earlier Albatros machines, and following the tendency of German machines, where a large portion of the wings is behind the rear main spars, a third and supplementary spar 15 mm. deep is fitted behind.

The spars finish off neatly with a bevel, the taper (more than 60 mm.) being on the upper face, the same as in the fighting machine.

The distance between the spars is maintained by 14 elliptical tubes of fairly large section (50 by 25 mm.) at the bases and summits of the interplane struts, half-way between the struts, and, in the upper wings, between the cabane and the innermost struts. All these tubes are embedded in the wings except the two which are placed between the bases of the innermost struts, where they are laid alongside. There are several diagonal struts of wood, instead of tubes as in other machines.

Above and below the struts the spars are fitted with special sockets to take the ends of the interplane struts, and the rear



Reproduced from "L'Aerophile," from a French Military Photo graph.

A C.III Type Albatros, captured by the French. The curious junction arrangement of the exhaust pipes, and the deep trailing edge of the wings are noticeable.

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out struts have lugs for the aileron cable pulleys. (See "Aeronautical Engineering" of last week.)

The ribs are disposed regularly. For the greater part of the span those of the upper wing alternate with the lower wing. Thus a rib in the upper plane is immediately above the intermediary beading referred to last week.

As in earlier types these beadings placed between the ordinary ribs consist, as with the beadings of the ribs themselves, of a tongue of ash 10 mm. wide by 3 mm. thick. They now extend only from the leading edge to the main rear spar on the upper side of the wing. (In the Rumpler the intermediary ribs are considerably shorter.)

The webs of the ribs are of white-wood, except that a few are of three-ply.

The leading edge, between the ribs, is of spruce.

The rear edge of the ailerons and the extreme outer edge of the wings consist of a tube with a triangular-oval section.

The trailing edge of the wings consists of a simple cord.

The ailerons consist of a metal frame, as of old. Their hinge is attached to the supplementary rear spar by plates which are fixed in front of this spar and thus pierce the fabric.

Each half-cellule (i.e., the upper and lower wing on each side) contains four streamlined interplane struts of steel tube, 53 mm. by 27 mm. in section, except for the inner rear strut, which is larger, 67 mm. by 30 mm.

The struts are labelled: V.i. = vordere innere (front inner); H.ä. = Hintere äussere (rear external), etc.

Their method of fixing was illustrated last week.

As with the other machines, the upper wings, after the removal of the cables, may be folded down upon the lower by a parallel movement made possible by the pivoted struts.

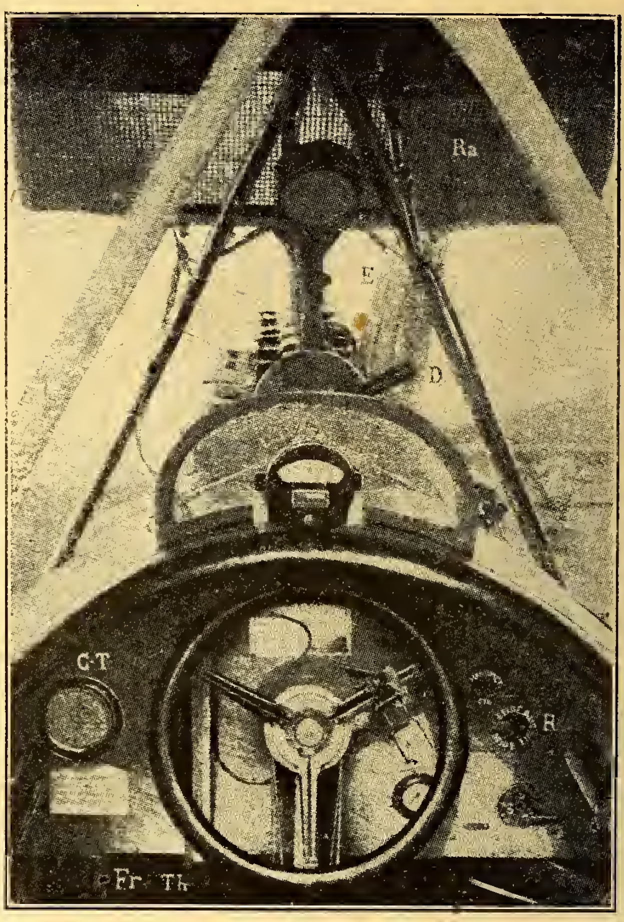
The cables are crossed, in an X-shaped casing to prevent damage from vibration, except that which connects the rear base of the cabane with the base of the rear inside strut, and another which joins the nose of the machine with the base and not the top of the front inside strut. The arrangement of the cables is designed to offer the minimum interference with the rear machine-gun.

The total length of the wing cables is 60 m., including wire strainers.

The internal bracing of the wings consists of piano-wire.

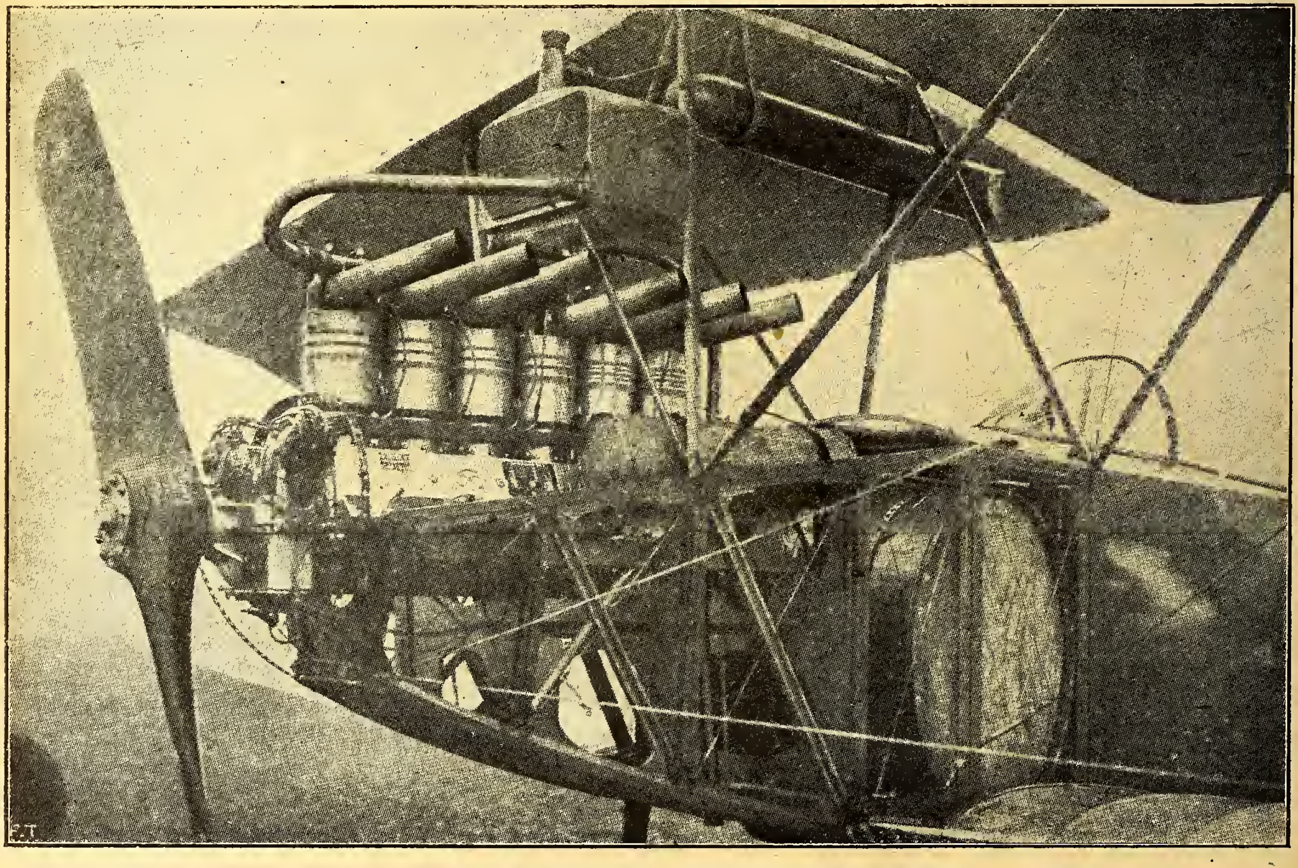
Contrary to the majority of other German biplanes, in which the fabric covering the machine is white, in the C.III it is buff-coloured.

Tail.—The fuselage ending in a **T** arrangement, owing to the top longerons not meeting at a point, gives a solid seating for both the elevator spar and rudder-post, and so permits the abolition of the old cable stays and of the upper strut of the 1915 type.



The Instrument board of a "C.III" Albatros, showing the arrangement of the Radiator, Compass, Revolution Indicator (C.T.), Switch, etc.

The fixed tail plane, fairly large and carrying some weight (incidence 55mm., or about 2.4 deg.) is built in two parts, rounded



Reproduced by courtesy of "La Guerra," the Italian Official Publication.

The Engine (a Benz) and fuselage nose of an Austrian Albatros of 1915-16 type, captured by the Italian Army.

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at the edges, and gives, together with the elevators, a semi-circular appearance which frequently leads to its being confused with the Aviatiks.

The two parts of the tail plane are fixed one on each side of the fuselage on the flanks and not on the top longerons.

The elevator is hinged by plates on the fixed-tail plane, and composed of two lobes mounted solidly on a tube, which is in two parts, the ends interlocking like a dog-clutch, and bolted together.

Conversely to the Rumpler fashion, the fixed triangular fin is longer and lower than formerly, so that it ends in front on the same line as the leading edge of the fixed tail. The rear end is fixed to the stern-post of the fuselage.

The rudder is unbalanced, and is hinged to the stern-post which terminates the fin.

The skeletons of the tail, fin, elevator, and rudder are entirely of steel tube as formerly. (In the "chaser" Albatros some wood is used in these members.)

Fuselage.—The fuselage is much as in the 1915 type. The rectangular base has a cowl or bonnet over it in front, the gun-ring farther aft, and the rest is surmounted by a rounded streamline fairing, composed of wood stringers without transverse members. This fairing tapers on the horizontal plane towards the stern, so that it finishes in a transverse horizontal line, instead of tapering to a point

The bottom of the fuselage meanwhile tapers to a point, so that the end view forms a kind of T, which gives excellent sustaining material for the tail spar and elevator tube horizontally, and for the stern post and rudder-post vertically.

The main supply pressure-feed tank forms part of the pilot's seat, as in the L.V.G. and Rumpler, but it is rather longer, so that a piece has to be cut out of it vertically to permit the elevator lever to oscillate rearwards.

The capacity is 225 litres. On a recent capture ("C.III.1788") the tank capacity was 217 litres, but this tank was surmounted by two sheet-steel receptacles, one of which had a capacity of 28 litres, so that with the gravity-tank (or "nurse," as the French call it) there was always a reserve supply with which to get home if the main tank were burst.

The filler-pipe is carried to the right, outside the fuselage, to facilitate filling up.

The gravity tank (or "nurse") is placed in the upper wings, rounded in front and tapered rearward. It has a capacity indicator, and holds 31 litres. It is of sheet steel.

A single pipe serves to fill the "nurse" from the pressure tank, and to redescend the petrol to the engine. Both pilot and passenger have hand-pumps. Sundry taps and levers regulate this elaborate pipe system as required.

The oil tank is also of steel, and is fixed on the left of the motor by steel straps. The shape is narrow and deep, and it holds $16\frac{1}{2}$ litres (in C.III,1788, it holds 23 litres.)

There is no exhaust-box to the motor, all six exhaust pipes uniting into one, pointed upwards in the form of a horn, the gases being thus confluent into one pipe opening (50 mm. by 95 mm.), which is self-supporting without stays, and is, doubtless, the best way of reducing head resistance.

For some unexplained reason, in some Albatroses the exhaust is on the right, and, in some, on the left, which seems strange if the engines are of the same make.

The radiator (honeycomb) is in front on a level with the upper wings, but not built into them as in the L.V.G. It is held by two brackets of flat iron and tubing. In front of the filler-pipe is a small open air-chamber, communicationg freely with the interior to regulate the steam pressure, and behind the filler-pipe is a little tube coupled to the top of the rear cylinder to avoid possibilities of an air-lock in the water circulation.

The Controls.—The elevator lever, on which the wheel is carried, is mounted on a transverse tube, which has a single crank at each extremity above, and none below. From each crank run two cables, one direct to the lower elevator crank, and the other forward over pulleys, and thence back to the upper elevator crank. This arrangement gets over the need for carrying cranks below the transverse tube into the bottom of the cock-pit, where they would be inaccessible.

The wheel on top of the elevator lever has three sheet-steel spokes, and carries the aileron cables on a double pulley without sprocket or chain. The cables run inside the lower wing to two pulleys, thence outside to the aileron and its crank, which is built into the wing.

The rudder-bar, which is very light, is carried on a pyramid of three tubes.

Instruments.—The C.III, like other German biplanes, is a general purpose machine, used for bombardment, fighting, and chasing, as well as for reconnaissance and artillery control. It carries a machine-gun aft in a revolving ring, and a fixed gun forward, synchronised with the motor, and firing through the propeller, by mechanism which will be described later.

In addition, it carries wireless apparatus, and photographic apparatus.

The compass is carried upside down in the upper plane. There is an elaborate lighting installation for the instruments, and a system of electric communication between pilot and passenger.

The other accessories are similar to those of other German biplanes, and are carried on a mahogany instrument board.

M. Lagorgette states that when flying, the Albatros gives an impression of excellent stability, especially laterally, and seems very flexible under control. The elevator, rudder and ailerons answer quickly to the controls. The machine is slightly unstable longitudinally, and has a tendency to throw her nose down.

This is doubtless due to the lifting tail. One assumes that this tendency is intentional on the part of the designers, seeing that the German pilots depend very largely for their escape from the Allies' "chasers" on the capacity of their machines to dive practically vertically. Such a manœuvre is impossible on a machine which is longitudinally stable, because the big tail which is necessary for absolute stability overcomes at high speeds the maximum angle of the elevator, so that instead of diving vertically the stable machine climbs horizontally across country—so to speak—while flying along a vertical downward path.

M. Lagorgette further states that the motor is "docile, and permits of excellent slowings."

Important Figures.

The following figures, compiled by M. Lagorgette, are of notable interest :—

	Kilogrammes
Weight of fuselage, with tail, but without fuel, oil, water, armament, wireless, etc.	346
Weight of wing cellules	160
,, motor	307
,, radiator water	25
,, Garuda propeller, with hub and bolts...	19
Total weight empty	857
Weight of petrol in tanks	182
,, oil	14
,, useful load...	300
Total load (about)	496
Total	1353

One notes that the weight is a trifle more than that of the Aviatik and the L.V.G.

Weight per square metre, 36 kgs.
Speed close to ground (maximum), 140 km.p.hr.
Speed at 2,000 metres, 135 km.p.hr.
Climb to 1,000 metres in 9 mins.
Climb to 2,000 metres in 22 mins.
Ceiling (maximum height) at 3,700 metres with 496 kgs. useful load.
Ceiling (maximum height) at 4,900 metres with 300 kgs. useful load.

Fuel load, 256 to 276 litres of petrol, 16 to 23 litres of oil, for $4\frac{1}{2}$ to $4\frac{3}{4}$ hours' running.

* * *

YORKSHIRE HUMOUR.

Those who know Mr. Oddy of Leeds, now one of our most famous propeller manufacturers, will readily understand that any social gathering of his employees would receive every encouragement from "the Guv'nor." One can therefore well believe that the concert and dance which took place a little over a week ago, by way of relaxation after many months of good and strenuous work, was very much of a success.

What the programme really contained is not known to the writer, but the burlesque programme published certainly suggests possibilities. A propeller-shop foreman booked to recite "There's many a slip 'twixt the boss and the tip." had undoubted chances, though whether a "tip" means a "war bonus" within the meaning of the Act, and whether "boss"="guv'nor"=managing director, in Leeds is not quite clear. However, one can guarantee that anyone who earns a war bonus in the firm of Oddy gets it without grumbling.

Another promising item was a suggested quartette of Admiralty and A.I.D. Inspectors, booked to recite "Half a mill! Half a mill!! Half a mill under!" Obbligato accompaniment, presumably, on micrometers and slide-rules.

Mr. Oddy tells of a proposal by one worker to another that he (Oddy) should be asked to play the part of "Ali Baba" in a sketch at the concert. Whereupon the other asked, "Who would be the 'Forty Thieves'?" "Why, us chaps, o' course," replied the first worker. Which is a pleasing recognition of the fact that it is not always the tyrannical master who robs the down-trodden workman.

Incidentally, the Yorkshire tyke is an ill man to tread upon, and he is a very fine workman when he is interested in his job. Judging by the Oddy output the men are keenly interested in winning the war, and they have precious little to learn about their jobs.

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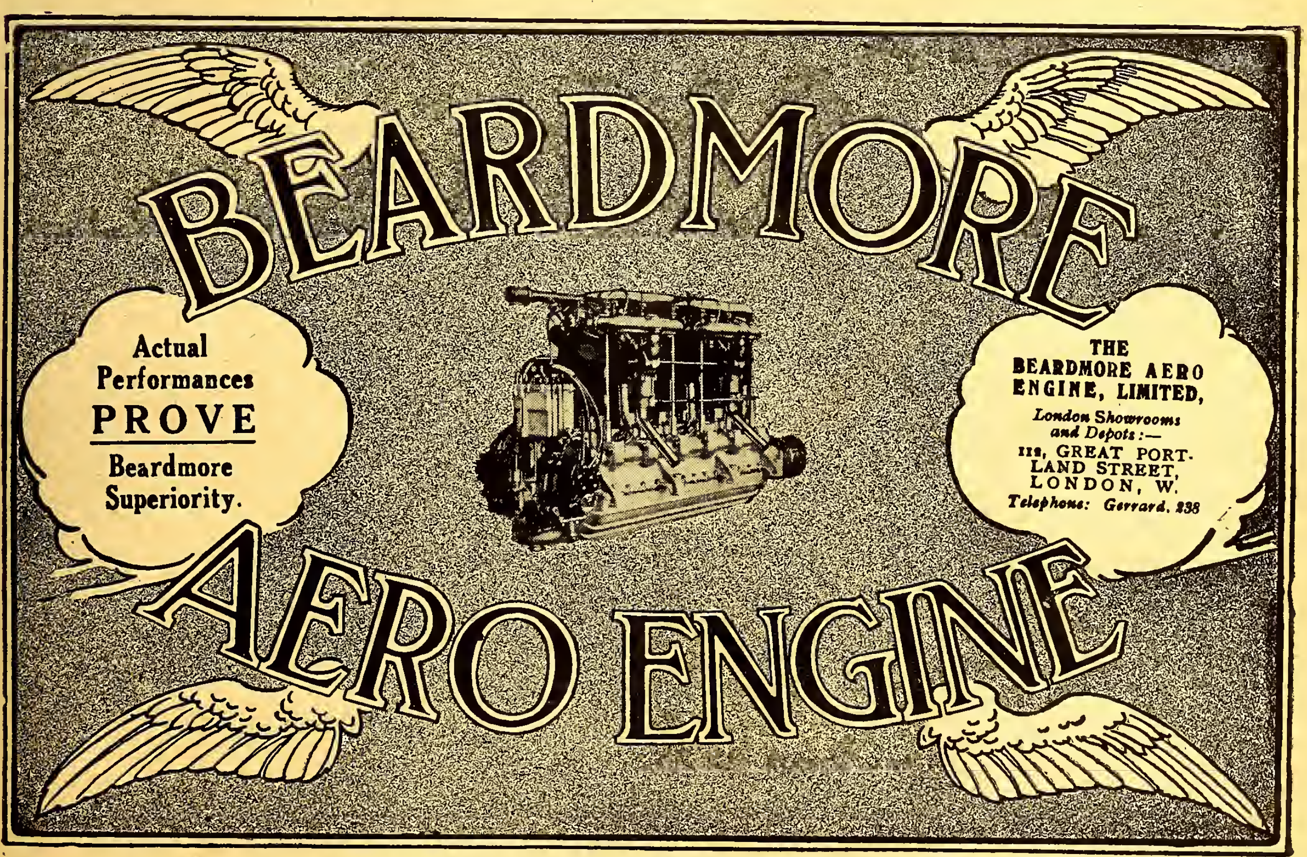

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THE SUNBEAM SWEEPSTAKE.

Not in any way behind the Stock Exchange in exploiting a patriotic sweepstake scheme with the view to swelling the Victory Loan were the Works Staff, the Works Committees, and operatives of the Sunbeam Motor Car Company's factory at Wolverhampton. The only fly in the ointment was afforded by the fact that the moving spirits in the enterprise were too modest in their ideas as to the extent to which it could be exploited. They limited it to 1,000 tickets at 2s. 6d. each, only to find that they could have sold five times the number; but as they did not want to interfere with each individual making his effort, the sweepstake was delayed deliberately until the last thing, so as to be merely supplementary to the workers' direct subscriptions to the War Loan through the Post Office, or by other means. Therefore, tickets were not available until 3 o'clock one afternoon; all of them were bespoke three hours later. Not fore-knowing how it would go, Mr. T. Barker, foreman of the erecting shop, and five colleagues, had generously guaranteed the purchase. Arrangements were made whereby, on drawing the numbers, applications went in direct in the winners' names. Perchance, the system of drawing is worth noting against possible future efforts of this kind. Into each of three bags were put numerals from 0 to 9. One of the works office girls was given charge of each of these bags, while three smaller girls picked a number out, each in turn, the numbers being drawn in the mess-room and chalked on a blackboard against the prize number in the order in which they were drawn out.

The first prize, £50, was won by E. Snead, of the new machine shop.

The second prize, £25, was won by H. Ball, of the fitting and assembling shop.

The third prize, £15, was won by F. W. Hubbard, of the new machine shop.

The fourth prize, £10, was won by A. Cashmore, of the finishing shop.

The fifth, sixth, seventh, eighth, ninth, and tenth, each of £5, were won respectively by:—H. Wilkes, J. Morris, T. C. Griffiths, E. Edwards, W. Howe, and H. Parker.

ELECTRO-GALVANISING.

One of the most effective methods which has yet been discovered for protecting the metal parts of aeroplanes, especially seaplanes, from the effects of the air and moisture is electro-galvanising.

Another process now being largely introduced is that known as Ironising or Ferro-Zincing. One essential feature of it is to coat steel surfaces to be protected with a layer of pure iron in addition to the more common coat of zinc.

The reason that zinc, as a protective coating for iron and steel, has held its own for so long is that it is electro-positive to the underlying iron or steel, or, in other words, in the presence of moisture the iron and zinc form a galvanic couple, and as long as there is any zinc left in contact with the iron within a given area the zinc corrodes in preference to the iron, thus protecting it.

It is a well-known fact that the purer the iron is the less liable it is to pitting and corrosion, chemically pure iron being practically rustless. The "ironising" process turns these facts to account by coating the steel surface with almost pure iron, the only impurity of any significance being hydrogen. The addition of hydrogen is an advantage, for the reason that it makes the iron slightly more electro-positive to the underlying steel than it would otherwise be, so that it forms a better protective coating.

Another advantage of the coating of electrolytic iron is that the coating is homogeneous and is not under unequal strain caused by mechanical operations such as drawing or hammering, and has not been subjected to any heat or mechanical treatment, which of necessity causes impurities to be absorbed by the metal so treated.

It is found in practice that it is advantageous to coat the electrolytic iron surface with zinc, as a zinc coating with an intermediate layer of pure iron hydrogen alloy gives a greatly increased life to an ordinary steel tube or plate for the reasons already given.

The inventor of the process—Mr. Sherard Cowper-Coles, of 1, French Street, Sunbury-on-Thames—granted a licence to the British Mannesmann Tube Company for the protection of boiler tubes, and is applying the process to a number of other purposes.

The Cowper-Coles Manufacturing Co. are now erecting special plant for producing rustless high tension steel wire for aeroplanes. They have also perfected simple machines for electro-galvanising small fittings for aeroplane construction. One advantage of this system is that the screw threads do not have to be recut.

WAR PROFITS IN ITALY.

The fiscal authorities are claiming some thirty millions of francs, or rather "lire," out of the 380 Piedmontese firms who are subject to the tax on "war profits." As might be expected, the F.I.A.T. and Gnome-Rhone firms at Turin figure in both senses in the list. So do the umbrella-makers—presumably perhaps because the weather has been so bad in the Alps.—T.S.H.

MARKET REPORTS.

Any Prices Given are for Quantities on the Usual Terms.

February 28th, 1917.

The object of these Reports is to record the fluctuations of the various markets which affect the Aircraft Industry. The reports will, generally, be classified under the following heads. For guidance, I have given in parentheses a few of the various aircraft materials affected:—

(1) Copper (Sheet, Tube, Ingots, Ferrules, Tacks, etc.)
(2) Steel (Bar, Sheet, Tube, etc.)
(3) Aluminium (Sheet, Tube, Ingots, Rivets, etc.)
(4) Timber (3-ply, Ash, Spruce, Walnut, Mahogany).
(5) Fabric.

COPPER.—The chief feature of the Copper Market is the upward tendency of prices in America. This is undoubtedly due to the political situation. The American position is not, however, having a marked effect on the Home Markets.

Current Prices:—Copper Sheets, £172. Copper Tube, S.D., 20¾d. Copper Ingot, £139, cash price (Standard): Brass Tubes, S.D., 17½d. Brass Sheet, 16⅜d.

STEEL.—It is reported that the steel makers intend forming a syndicate with the following objects in view:—(a) To keep out foreign steel after the war; (b) To maintain prices at their present level or, if possible, to get them higher.

A continuous stream of inquiries is being received in Sheffield from all parts of the world. This fact, combined with the unprecedented accumulation of orders, dominates the whole position. The majority of the makers are refusing orders, many of them having sufficient on their books to keep them going for periods ranging from twelve months to two years.

It is more than likely that prices will advance in the near future.

*R.A.F. Spec. 3A Steel, †42s. to 46s. *R.A.F. Spec. 1D Steel 86s. to 90s. R.A.F. Spec. 9A Sheet Steel, 29s. to 30s.

* Average works prices only. † Under ⅞ in. rounds.

ALUMINIUM.—This is entirely under the control of the Ministry of Munitions, and the official prices for Ingots are now:—£225 Deld. Remelted, £210. *R.A.F. Aluminium Sheet, 2s. 7½d. to 2s. 10½d. per lb.

* Average price only.

The control of aluminium is becoming more stringent, and the Ministry of Munitions have issued further orders, which, briefly summarised, are as follows:—

"Commencing March, 1917, all persons shall in the first seven days of each month send to the Director of Materials, A.M.2 (H), Hotel Victoria, Northumberland Avenue, London, S.W., monthly returns of:—

(a) All aluminium held by them in stock or otherwise under their control on the last day of the preceding month.
(b) All aluminium purchased or sold by them for future delivery, and not yet delivered on such last day, together with the names of the sellers to, or purchasers from, them.
(c) All aluminium delivered to them during the preceding month.
(d) All aluminium scrap or swarf produced by them, and/or issued from their works during the preceding month.
(e) All contracts or orders existing on the last day of or entered into during the preceding month requiring for their execution the use of aluminium, specifying the purpose thereof.

"Full particulars can be obtained from the above address."

TIMBER.—Shippers had a very difficult time during 1916, and there does not appear to be any promise of the situation easing during 1917. The tendency of prices for Silver Spruce is certainly upward. English Ash supplies are not so difficult, but dry wood is very scarce; prices are very steady. Propeller Walnut is practically unprocurable, consequently the demand for Mahogany is rapidly increasing; prices are advancing.

Recent experiments show that it is very unlikely for Poplar to be used in substitution for Silver Spruce.

Average Prices:—Silver Spruce, 13s. to 14s. c.f. English Ash, 11s. to 13s. c.f. Walnut, 2s. 3d. super. Mahogany, 1s. 9d. log; 1s. 10d. to 2s. super. (Prices are for quantities, delivery, and selection.)

FABRIC.—The War Office have now assumed control of Linen Fabric, and all demands must be sent to Capt. Stanley Clark, D.A.E.4 S.3, Room No. 506, Hotel Cecil, Strand, W.C., on Form No. 110, which can be procured from the address given.

Manufacturers have not yet been officially informed of the price, but it is reported that it will be about 29d. per yard 36 in. wide. The price ruling last November was 23-24d. per yard 36 in. wide.

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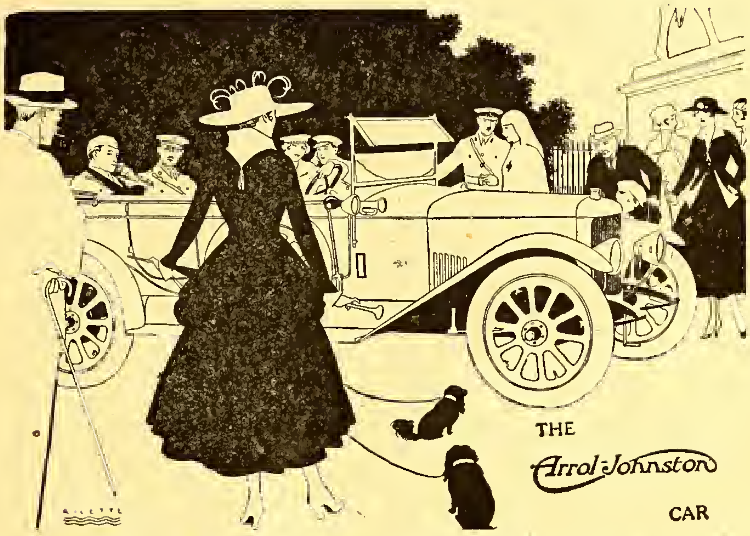

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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

THE ORIGIN OF SPECIES.

To create out of one thing, something entirely new, embodying all its qualities, combined with those of another wholly different, has ever been a human foible, no doubt affording infinite amusement to the gods. Still, the attempt has occasionally succeeded, more or less. Hence, the nectarine and the two-stroke motor.

Now, beyond the fact that they are both prime movers, nothing could be more unlike a steam-engine—at least, physically—than an internal combustion motor. There is a certain mechanical resemblance, of course, in their common combination of cylinder, reciprocating parts, and rotating shaft. Wherein, no doubt, lay the temptation to make the latter resemble the former, in spite of the physical difference that the one is an external combustion, constant-fluid-pressure-motor, working on a closed cycle, while the other is an internally explosive affair working on an open one.

So it seems highly likely that James Robson, of Tangye's, had it in mind to produce something as like a double-acting steam engine as he could, when, in 1870, he patented the first two-stroke motor on record, which was, nevertheless, as much single-acting as any other.

For, mechanically, there was the same junk-piston, with its rigid rod, gland and crosshead slide jointed to a connecting-rod; the cylinder space beneath the piston being devoted to primary induction from a clack-valve of sorts and having a transfer tube to the combustion-chamber above: while an exhaust port about two-thirds down the cylinder trunk, towards, but not quite at, the end of the comparatively short piston-travel, duly provided an escape for the burned gases.

Now, the benzine motor being then an undiscovered calamity, the Robson motor was a gas-engine. It was like the also undiscovered village maiden, as good as it was simple. So good, indeed, that it not only was far better than the later Otto gas-engine, but no sooner had its patent expired than it was freely adopted by all and sundry; as a gas-engine to begin with, and later, in vertical type, as a marine oil-engine.

Actually, its constitutional essentials, physical and mechanical, practically speaking, are fundamental to all two-stroke motors.

THE TWO-STROKE THEOREM.

You cannot get away from the phases of the Beau de Rochas cycle of induction, compression, firing, and exhaust. The only intention of the two-stroke cycle is to have the phases paired as to (a) firing stroke and primary compression; (b) induction and secondary compression occurring simultaneously, with the exhaust-phase comprised in an instant's opening at or near the end of the firing stroke.

All for the purpose of doubling the effective working strokes on the crank within a given time.

And very nice, too. So simple, on paper, by this means to get a theoretical duplication of developed h.p. In practice, so fraught with physical pitfalls and treacheries, that it has mostly beaten the average designer, who, being dependent more or less on his commercial production for the holding of his job, preferred to behold it afar off—and keep it there—as a mere ideal.

THE CONCEALED OBSTACLE.

There was also one little obstacle that effectively prevented that doubling-of-power idea from being even nearly achieved. Being entirely physical, it has mostly gone undefined, if not unsuspected to this day. It is merely that this very instantaneous exhaust expulsion that shortened and practically eliminated the most awkward phase of the cycle, got rid of perfectly good gas wholesale, long before its expansive potency was done with: so that anything from one-half to one-third of its thermal pressure efficiency was wasted. That is, in the ordinary way.

There was nothing to save these losses, corresponding to the retention by delayed, or gradual, exhaust opening of Daimler's hit-and-miss device. Never since Robson's day—except in one instance—has there been any corresponding equivalent contrivance. For the reason, chiefly, that you must be able to diagnose the defect before you can set about to discover the cure. However, for the last year or two, that contrivance has existed in one instance, as will be seen later on.

WARUM?

Still, the "practical" man who does not want to wade through reasons, wants to know why, if the two-stroke proposition were so good it did not forthwith strangle the four-stroke one, instead of lying practically *perdu*. The question is as logical as to ask, why since we are so superior to the Huns, we are not occupying Berlin at this moment; having duly burned the Kaiser and his sons at the stake, and hanged our own wait-and-sees and chief Jews.

But one only begins to frame the answer to this question, by noting the fact that, material apart, the higher refinements of engineering were then unknown. At least, they had not got past watch-making and rifle-actions until the middle 'eighties were well past. Not even from these to breech-block mechanics did they move until smokeless powder and bigger guns called for them. And the minting, coin-sorting machinery of one firm was a family affair, not the common property of an industry.

As to motor-work, one may say that all present refinements—not one of which can we do without in two-stroke practice—have been mainly developed by trial-and-error on the road. The difficulty, then, being to make a motor that would run at all, the easier project was to follow more or less established gas-engine practice and the successive-phase four-stroke division of the Beau de Rochas cycle. There was, then, some hope that the result would work, and stay working; hope being thus translated into the common terms of probable financial backing.

Especially in a Victorian age, rotten with materialism, worshipping mediocrity, and hating ideas with truly protestant fervour.

THE ANSWER.

Such was the why of it, in the abstract. In the concrete, of course, mathematics and tool-craft together might help to the working result. The genius of a Georgia Knap might classify it, might codify certain basic principles—most of them still debatable—into general *secrets de fabrication*. None the less all these things had—still have—to be known and so sifted and adapted that one has almost to set aside and forget the trammels of mechanical practice, before one can hope to re-adapt practice to the invention of a two-stroke motor of even equal efficiency to a four-stroker of the same volume, let alone fulfil the ideal of double power.

For the apparent simplicity of the two-stroker is so treacherous that unless it be wholly right, it is altogether wrong from the efficiency standpoint, and may even refuse to run.

Here, again, one must not forget that the mechanical simplicity of the two-stroke cycle is—or should be—of such a kind, that very little mechanical novelty—on which alone patents are granted—is possible and even feasible. One must know its history *au fond*. It is no use re-discovering a dead man's perfect project that also died of neglect. Which infers endless brass-rubbing among the memorials of Southampton Street and the Rue de l'Université.

Of course, one may be a budding Lanchester or another Forest; a Georgia Knap or an Ambroise Farcot. That will soon be determined in two-stroke design. At any rate, one can

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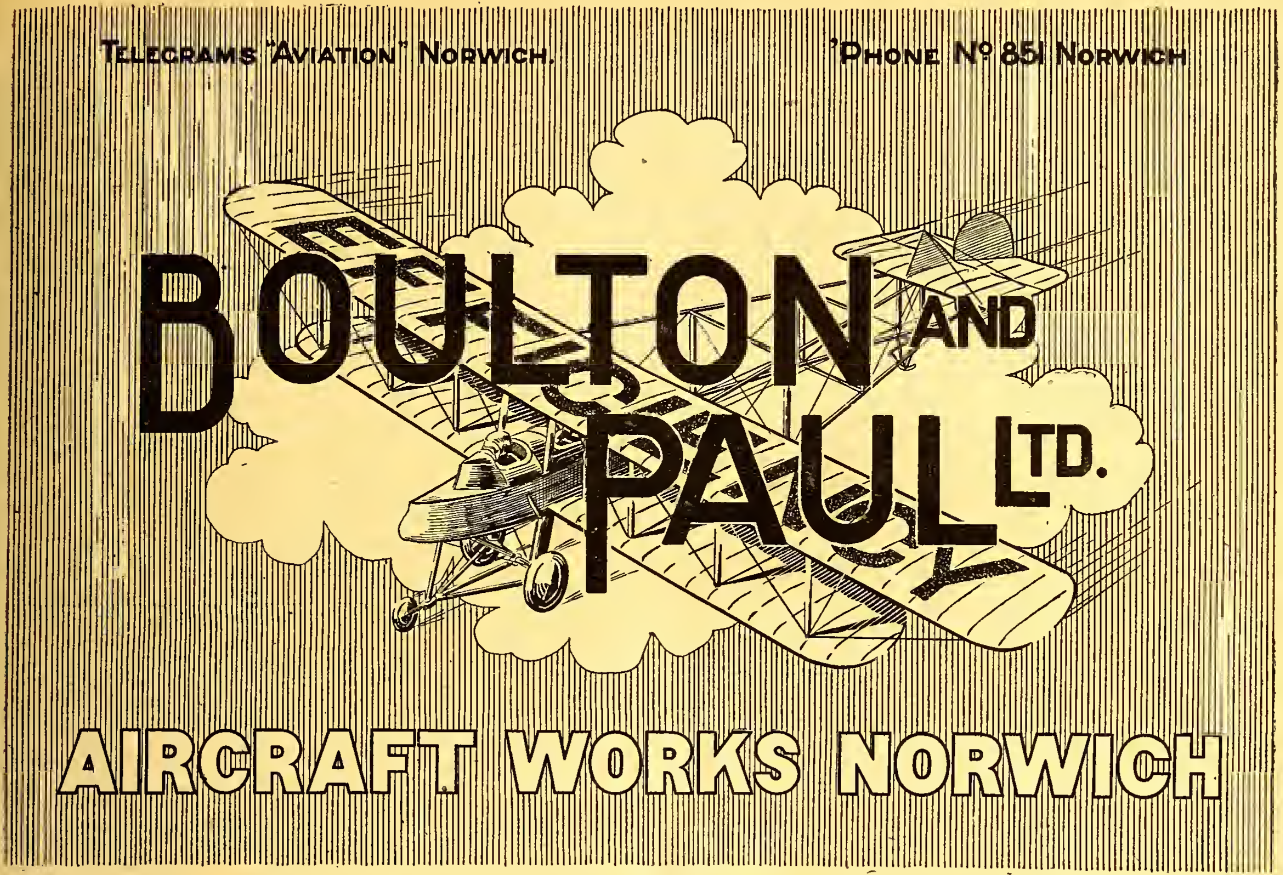

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gather, even as a lay-motorist, some idea why so little has been done in the two-stroke division in commercial production.

The Scavenging Fallacy.

But right down to recent years, designers of two-stroke motors have, in most cases, been smitten with the fatal obsession that definite scavenging of the exhaust was necessary to improve efficiency. When—as will have already been inferred—the very fact of the wastefulness of the instantaneous exhaust-phase, unless special means are provided to check it, *positively interdicts scavenging methods* in a two-stroker.

One can only suppose that this disastrous idea arose from the use, in the original slow-running Daimler motor, of the piston valve; which was intended to act as a snifter-valve, rather than an air-scavenger, though it had a scavenging effect in practice. Air-scavenge may also be necessary in stationary gas-engines, running not over 300 r.p.m. But the moment that r.p.m. is materially exceeded, or speed variations of more than 5 per cent. introduced—to say nothing of any such projected speed as the present everyday 1,000 to 2,000 r.p.m. at which two-stroke motors habitually run—*scavenging is fatal to efficiency,* and as often as not, to the motor running at all!

The fact that no attempt has ever been made to embody it, in any successful two-stroker, has made all this knowledge inferential—albeit indefinite—among motor-designers and engineers in general, any time for the last ten or fifteen years.

Yet it would seem that the Adastral "experts" are hopelessly ignorant of all this, as *they positively prescribe the inclusion of this fatal defect of air-scavenge.* And for aeromotors! To say nothing of specifically arguing against the very points which lengthy research has discovered for two-stroker improvement, the merit of which has been proved in actual practice.

Hence the wisdom of Lord Palmerston's maxim for incompetent officialdom: "Never give your reasons."

The Demand for the Two-stroker.

However, now that the urgent needs of aviation demand the most powerful motor; with the most even torque, vibrationless balance and absence of couple; within the smallest compass; with the utmost mechanical simplicity; and all upon half the weight if possible without any lessening of strength or increase of a given weight of petrol or water-cooling, the consideration of the two-stroke proposition and its *actualities,* let alone possibilities, becomes not only interesting, but urgent.

Thus one need not apologise for a detailed review of what has been done, and the reasons for success or failure. We must also never forget that the key of the two-stroke proposition, mechanically—and indeed its chief attraction—is the fact that the valve-gear, with all its parts and power-loss—to say nothing of its production-cost—is merged in the slide-valve function of the working-piston itself. There, indeed, is £ s. d. invention: the only kind that has a chance to succeed.

The most modern two-stroke practice—following the lines of the foregoing precise demand of aviation—also prescribes the embodiment of the mechanism of *refoulement*—in other words, the primary induction, compression, and more or less pressure-fed secondary induction into the working end—as part and parcel of the cylinder on the one hand, and the working piston itself on the other.

When this is achieved, success is assured, provided that other physical considerations have been adequately studied. Hence the most permanently successful solution of the problem has been the double-ended piston of differential diameters, the upper end as the worker, and the lower, larger one, as the charge-pump: combined with a cylinder designed to corresponding diameters. Incidentally—a point of great importance, nevertheless—this arrangement eliminates crank-chamber induction and pre-compression with all its radical defects.

At any rate, with all these considerations in mind, it is easy to see how in the 'seventies the Robson-cycle was eventually dropped, since the production of motors of all sorts and sizes called for more time and research than was available, and in any case, showed no immediate demand.

So far as I can remember—the patents having long since expired—this cycle was only revived in one East-country-built marine motor, seen at a single Cordingley show, and in the Webster and Bickerton model which hailed from Goole. In any case, the height of it, consequent upon its essential design, and its short connecting rods with their extreme thrust-angularity, disqualify it for aerial use; though its principle has to some extent been embodied in that curious French X type motor, the Berthaud.

(*To be continued.*)

New Patents.

This list is specially compiled for The Aeroplane by Rayner and Co., Registered Patent Agents, 5, Chancery Lane, E.C.

Latest Patent Applications.

2417. W. van Breeman. Air-propeller. 19/2/17.
2569. S. F. Burgoine. Aircraft. 21/2/17.
2552. J. Gilbert. Airship or aircraft structures. 21/2/17.
2469. A. Nicholson. Fuel tanks for aircraft, etc. 20/2/17.
2565. H. A. Savage. Automatic guns for aircraft. 21/2/17.

Specifications Accepted this Week.

104,114. T. D. Kelly. Aeronautical machines.
104,125. F. H. Royce, B. I. Day, and Rolls-Royce, Ltd. Landing gear for aircraft.

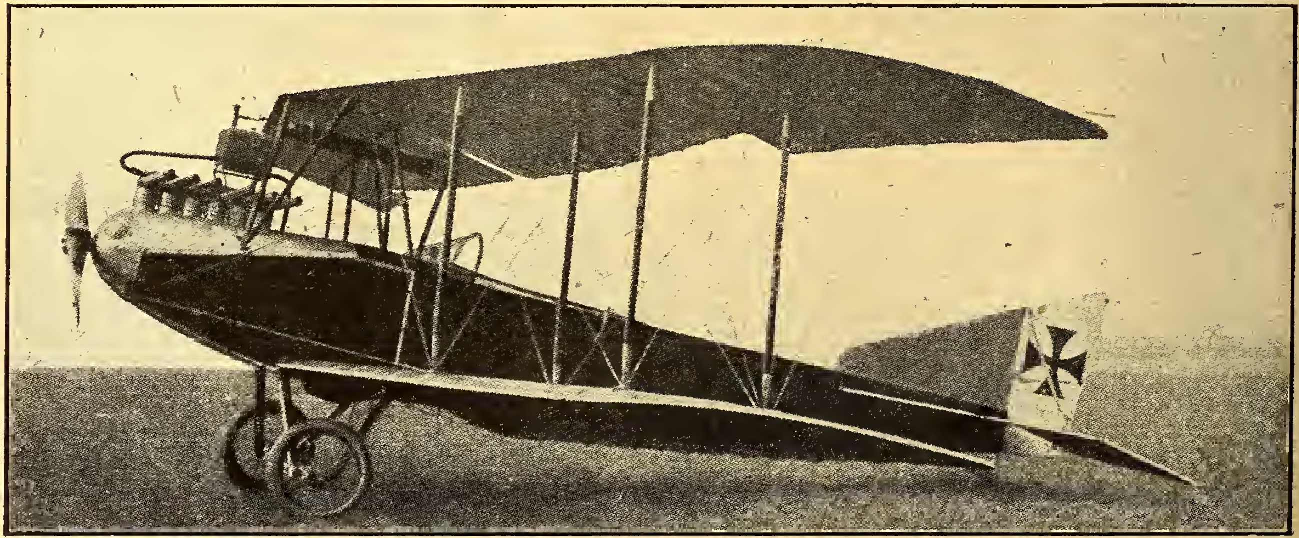
Specifications Published this Week.

103,918. B. Hinkler. Duplicate controlling means applicable to aeroplanes and the like.
102,261. Curtiss Motor Co. Machines for aerial and nautical navigation.

Latest Published Abstracts.

15,404. Hydro-aeroplanes. H. C. Mustin. Naval Aeronautics Station, near Pensacola, Florida, U.S.A.

A brake for a hydro-aeroplane comprises two bodies preferably of streamline form, connected to the machine by a cable, and each provided with laterally projecting wings, tail-planes, and vertical stabilising fins. The wings on the upper body tilt upwards and forwards, tending to lift the brake in the water, but the wings on the lower body tilt downwards and forwards, tending to submerge the brake. The bodies are carried on the machine nested together, the vertical fin on the lower body being detachably secured in the slot in the upper body, and the cable being detachably held in spring clips; on striking the water, the bodies open out. To prevent excessive shock when the brake first takes the water, a coil or rubber spring is provided in the cable, or the cable is wound on a friction drum. The cable is attached to the machine at the rear of the centre of gravity, causing the tail of the machine to tilt down when alighting.



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An Austrian Albatros (1915 Type) captured by the Italian Army. It will be noted that it is a species of "1½ Strutter."

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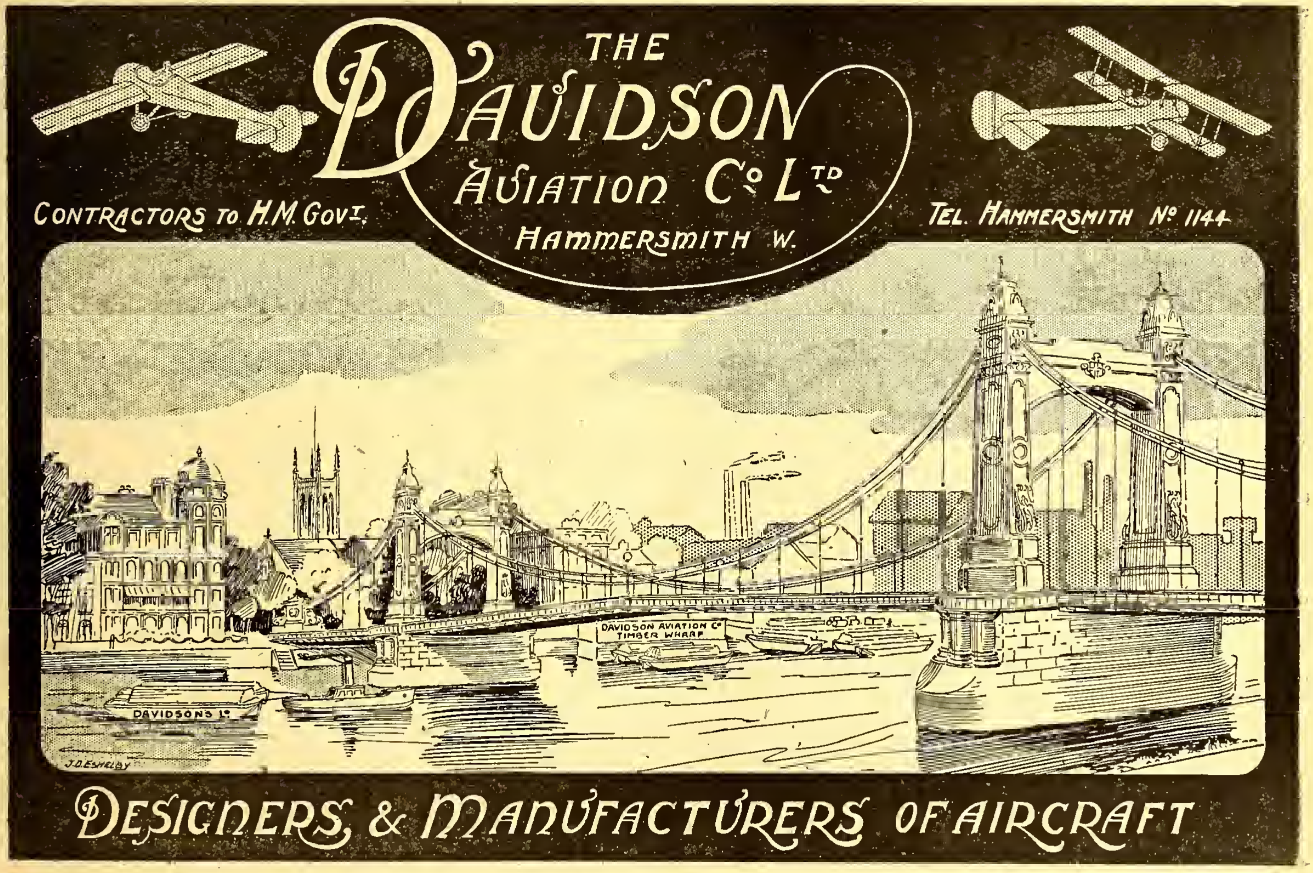
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DESIGNERS & MANUFACTURERS OF AIRCRAFT

(Continued from page 612.)

Flying Officers.—Temp. Lt. T. C. Chamberlin, attd. Midd'x R., and to be transfd. to Gen. List, Feb. 6th. Temp. Sec. Lt. (on prob.) E. R. Gunner, R. Scots, and to be transfd. to Gen. List, Feb. 8th. Sec. Lt. (on prob.) W. Green, R. Highrs., T.F., and to be secd., Feb. 10th. Sec. Lt. (temp. Lt.) N. S. Beswick, W. Rid. R., T.F., and to be secd.; temp. Sec. Lt. V. A. Berridge, attd. Bedf. R., and to be transfd. to Gen. List; Sec. Lt. (on prob.) H. E. Faulkner, Lond. R., T.F., and to be secd., Feb. 11th. Sec. Lt. (temp. Lt.) A. W. Smith, L'pool R., T.F., from a Flying Officer (Observer), sen. from April 29th, 1916. Temp. Sec. Lt. A. C. H. Groom, attd. L'pool R., and to be transfd. to Gen. List; Sec. Lt. K. R. Furniss, Yeo., T.F., and to be secd.; temp. Sec. Lt. W. A. Southey, Gen. List; Sec. Lt. (on prob.) R. N. Hall, R.F.A., Spec. Res.; temp Sec. Lt. (on prob.) J. L. Murray, Gen. List; temp. Sec. Lt. (on prob.) R. S. Watt, attd. Bord. R., and to be transfd. to Gen. List; Sec. Lt. R. C. Orlebar, Spec. Res., Feb. 12th. Sec. Lt. (on prob.) R. G. Ottey, Leic. R., Spec Res., and to be secd., Feb. 13th. Lt. H. O. D. Wilkins, Bedf. R., and to be secd., Feb. 14th.

Balloon Co. Comdrs. (graded as a Sqdn. Comdr.).—Lt. (temp. Capt.) E. B. Broughton, Spec. Res., from a Co. Comdr. (graded as a Flt. Comdr.) and to be temp. Maj. whilst so empld., Feb. 21st. Graded as a Flt. Comdr., Capt. W. J. Alexander, Devon R., from a Balloon Comdr., Feb. 12th.

Equipment Officers, 3rd Cl.—Sec. Lt. (on prob.) W. H. Bokenham, Spec. Res., Dec. 20th, 1916. Sec. Lt. A. W. Gillespie, Spec. Res., Dec. 27th, 1916. Sec. Lt. (on prob.) H. F. L. Dixon, Spec. Res., Feb. 8th. Sec. Lt. C. G. Sweet, Spec. Res.; Sec. Lt. F. A. Thomas, Spec. Res.; temp. Sec. Lt. (on prob.) M. Thompson, Gen. List; temp. Sec. Lt. E. A. Tottle, Gen. List; Sec. Lt. R. A. Trelease, Spec. Res.; temp. Sec. Lt. H. A. Thomas, Gen. List; Sec. Lt. (on prob.) E. C. Deeth, Spec. Res.; Sec. Lt. R. H. Grant, Spec. Res.; Sec. Lt. B. E. Harris, Spec. Res.; Sec. Lt. V. S. Holbrook, Spec. Res.; Sec. Lt. A. Miller, Spec. Res.; temp. Sec. Lt. (on prob.) E. W. Lawrence, Gen. List; temp. Sec. Lt. G. G. Onions, Gen. List; Sec. Lt. (on prob.) H. N. O'Donnell, Spec. Res.; Sec. Lt. T. Moore, Spec. Res.; Sec. Lt. H. R. Mosenthal, Spec. Res.; Sec. Lt. (on prob.) P. P. Nicholl, Spec. Res.; temp. Sec. Lt. H. J. Paton, Gen. List, Feb. 14th.

Memoranda.—To be temp. Lts. whilst serving with R.F.C.:—Sec. Lts. F. O. Cave, Rif. Brig.; F. N. Hudson, M.C., E. Kent R.; F. L. J. Shirley, York R.; C. R. Steele, York R.; J. M. Stubbs, Hrs.; W. R. S. Wilberforce, K.R.R.C.; L. G. Wood, Devon R.; temp. Sec. Lt. H. R. Davies, R.E., Spec. Res.; Sec. Lts. R. A. Grosvenor, D. Gds., Spec. Res.; J. P. C. Mitchell, High. L.I., Spec. Res.; W. H. L. Poole, D. of Corn. L.I., Spec. Res.; W. H. Ruxton, R. Ir. R., Spec. Res.; Sec. Lt. (on prob.) A. R. M. Scrase-Dickins, K.R.R.C., Spec. Res.; Sec. Lt. (on prob.) L. O'G. Whitfield, Manch. R., Spec. Res.; temp. Sec. Lts. P. J. Barnett; G. E. R. R. Lacey; J. H. Medcalf; R. G. Meech; A. D. Mackay, attd. Arg. and Suth'd Highrs.; M. G. P. Phillips; K. B. Wild; Sec. Lts. R. D. W. McKergow, D. Gds.; W. J. Wyatt, Devon R.; A. L. M. Van der Byl, R.F.A., Spec. Res.; F. A. Prescott, Bord. R., Spec. Res.; W. J. Pierce, L'pool R., Spec. Res.; A. W. Phillips, M.C., R. Fus., Spec. Res.; Sec. Lt. (on prob.) E. E. Macartney, R.G.A., Spec. Res.; Sec. Lt. J. Grieve, S. Lan. R., Spec. Res. Temp. Sec. Lts.:—J. Senior, W. York R.; E. H. N. Stroud, attd. Leic. R.; C. B. Dolphin, A.S.C.; B. W. Hill; C. G. Ronaldson-Clark; C. W. D. Holmes, attd. Bedf. R.; G. L. Graham, attd. Hrs., Feb. 1st.

M. Thompson to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Dec. 11th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—The following Sec. Lts. (on prob.) are confirmed in their rank:—R. A. Trelease; F. A. Thomas; C. G. Sweet; J. Y. Watson; J. C. F. Williams; W. H. Bokenham; A. W. Gillespie; S. L. Amor; H. Smith; T. Moore; A. T. Crook; E. W. Brooks, H. L. Dawson; R. H. Butler; H. R. Mosenthal; W. A. Sievwright; F. E. Bayley; D. Rintoul; B. E. Harris; V. S. Holbrook; R. H. Grant; A. Miller; R. C. Orlebar. To be Sec. Lts. (on prob.):—E. C. Deeth, Dec. 8th, 1916; J. S. V. Stephen, Feb. 13th; A. C. Truelove, Feb. 15th; C. J. Couchman; C. Guthrie, Feb. 16th.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. K. R. Furniss is secd. for duty with the R.F.C., Feb. 12th.

R.H. and R.F.A.—Sec. Lt. (temp. Lt.) F. G. Brown is secd. for duty with R.F.C., Dec. 15th, 1916, substituted for that which appeared in "Gazette" of Jan. 13th under heading R.F.A.

R.E.—Sec. Lt. H. G. Ross is secd. for duty with the R.F.C., Feb. 13th.

Infantry.—Yorks R.—Sec. Lt. (temp. Lt.) A. W. Martin is secd. for duty with the R.F.C., Feb. 14th.

High. L.I.—Sec. Lt. T. P. W. Young is secd. for duty with the R.F.C., Feb. 17th.

Lond. R.—Sec. Lt. (temp. Lt.) W. R. Phillips is secd. for duty with the R.F.C., Jan. 31st.

* * *

War Office, March 3rd.

The King has been graciously pleased to approve of the appointments of the following officers to be Companions of the Distinguished Service Order in recognition of their gallantry and devotion to duty in the field:—

Sec. Lt. (temp. Capt.) George Cyril Bailey, R.F.C., Spec. Res.

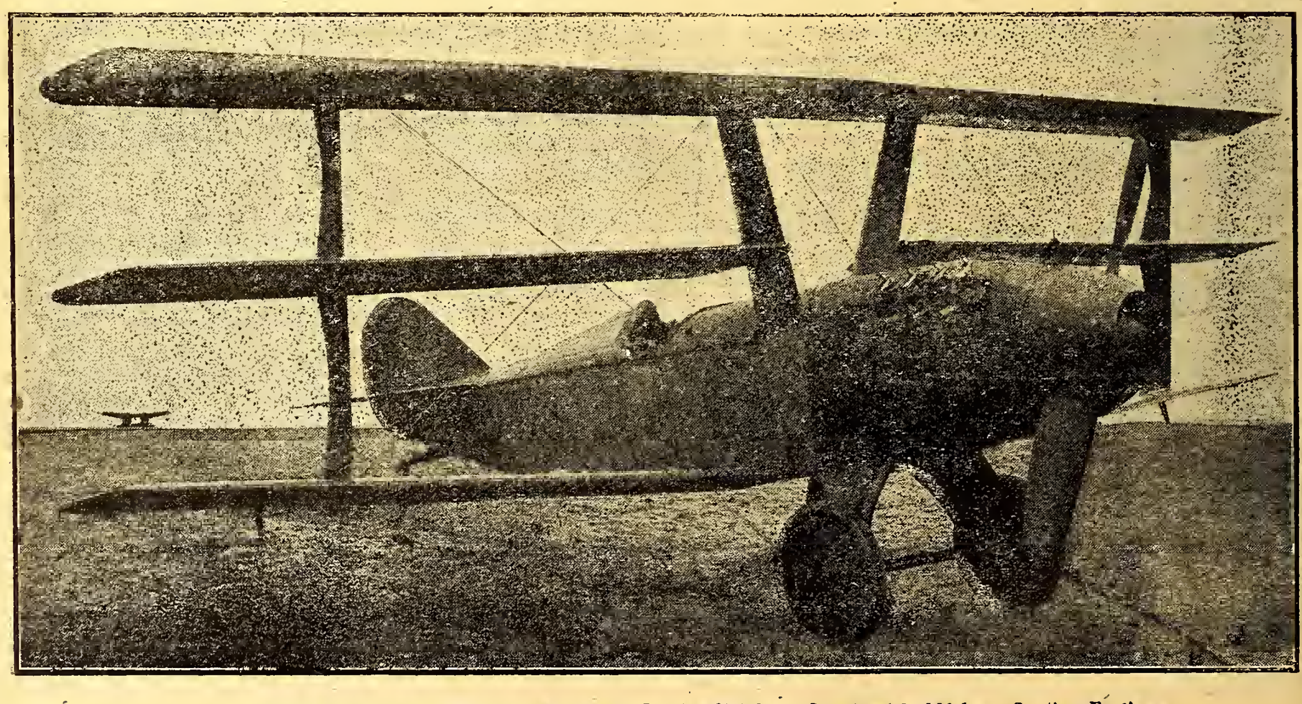
He co-operated in an infantry raid by flying over the enemy's trenches at a height of only 1,500 ft. for more than an hour and a half in very adverse weather conditions. He attacked the enemy in the trenches with machine-gun fire, and located sixteen active enemy batteries during the flight. He has repeatedly done fine work.

Lt. (temp. Capt.) Justin Howard Herring, M.C., R.F.C., Spec. Res.

He displayed great courage and initiative in bombing an enemy gunboat which was towing a bridge upstream. He flew continuously for six hours under heavy rifle fire, and seriously harassed the enemy by preventing his bridging operations. On another occasion he carried out a successful raid and brought back most valuable information.

Bt. Lieut.-Col. (temp. Brig.-Gen.) William Geoffrey Hanson Salmond, R.A. and R.F.C.

For conspicuous ability and devotion to duty when personally



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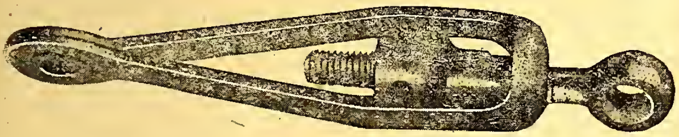

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directing the work of the Royal Flying Corps during the action. The striking success attained was largely due to his magnificent personal example.

The King has been pleased to award a Bar to the Military Cross to the following officer :—

Lt. (temp. Capt.) Walter Dalrymple Maitland Bell, M.C., R.F.C., Spec. Res.

He has on several occasions displayed great courage and determination in aerial combats with enemy machines. (Military Cross awarded in "Gazette" dated June 26th, 1916.)

The King has been pleased to confer the Military Cross on the following officers and warrant officers, in recognition of their gallantry and devotion to duty in the field :—

Temp. Sec. Lt. Allan Denison, Gen. List, and R.F.C.

Although wounded, he continued single-handed to fight two enemy machines, and succeeded in bringing one of them down. Later, although his machine was badly damaged, he effected a successful landing. He has at all times displayed marked courage and initiative.

Temp. Capt. William James Yule Guilfoyle, R.F.C.

He carried out a daring bombing raid and made a valuable reconnaissance under heavy fire during the same flight. He has at all times set a fine example.

Temp. Sec. Lt. (temp. Lt.) Shirley George Kingsley, Gen. List and R.F.C.

He was attacked by three hostile machines and shot down. To ensure that his machine would be destroyed, he deliberately landed in the sea at great risk to himself, as he had been wounded, and only with difficulty swam ashore.

Lt. Gerald Merton, R.F.C., Spec. Res.

Whilst on reconnaissance he attacked and drove down a hostile machine. Later, although his machine was badly damaged, he succeeded in regaining our lines.

Temp. Sec. Lt. (temp. Lt.) Stanley Keith Muir, Gen. List and R.F.C.

He carried out a daring bombing raid and was largely instrumental in shooting down a hostile machine. On another occasion he pursued two enemy machines and succeeded in bringing one of them down.

Sec. Lt. (temp. Lt.) Elmer Peter Roberts, R. Suss. R. and R.F.C.

He three times dispersed an enemy working party with bombs and machine-gun fire from a height of 1,000 ft. On another occasion he shot down an enemy machine. He has shown great determination on many occasions in taking photographs under most difficult conditions.

Lt. Walter Somerville Scott, Lan. Fus. and R.F.C.

On several occasions he displayed great skill and daring in carrying out his orders under dangerous conditions.

Temp. Sec. Lt. Lewis Scott White, Gen. List and R.F.C.

When acting as observer he co-operated in an Infantry raid by flying over the enemy's trenches at a height of only 1,500 ft. for more than an hour and a half in very adverse weather conditions. He attacked the enemy in the trenches with machine-gun fire, and located sixteen active enemy batteries during this flight.

* * *

From the "London Gazette" Supplement, March 5th, 1917.

War Office, March 5th.

REGULAR FORCES.—Temporary Appointments at War Office.—Dep. Asst. Dir.—Qmr. and Hon. Lt. (temp. Capt.) T. Lyons, R.F.C., and to retain his temp. rank whilst so empld., Dec. 14th, 1916.

Establishments.—R.F.C.—Flt. Comdrs.—From Flying Officers and to be temp. Capts. while so empld. :—Sec. Lt. V. J. Whitaker, Linc. R., Spec. Res., Feb. 14th. Lt. R. H. M. S. Saundby, R. War. R., T.F., Feb. 20th. Temp. Lt. H. Fowler, Gen. List, Feb. 22nd.

Flying Officer.—Temp. Lt. F. L. Atkinson, Gen. List, Feb. 13th.

Balloon Comdrs.—(Graded as Balloon Officers.)—From Balloon Officers :—Capt. W. J. Alexander, Devon R. ; Lt. P. G. Bateman, Lond. R., T.F. ; temp. Lt. O. H. Weekes, A.S.C. ; Sec. Lt. (temp. Lt.); A. M. Van der Byl, H.A.C., T.F., and to be secd. ; temp. Lt. V. D. Drury, R.E. ; Lt. T. F. Lucas. R. War. R., Spec. Res. ; Sec. Lt. (temp. Lt.) G. B. Robotham, Notts and Derby R., T.F., and to be secd. ; temp. Lt. G. K. Simpson, Gen. List ; temp. Lt. P. Worthington, M.C., Gen. List ; Sec. Lt. (on prob.) (temp. Lt.) E. L. B. Buchanan, R.F.A., Spec. Res. ; Sec. Lt. (temp. Lt.) H. P. L. Higman, R.E., T.F. ; Sec. Lt. (temp. Lt.) J. R. Bedwell, R.G.A., T.F, and to be secd. ; temp. Sec. Lt. (temp. Lt.) W. A. Dunn, Gen. List, Jan. 29th From Balloon Officers, and to be temp. Lts. while so empld. :—Temp. Sec. Lt. T. N. Jennings, Gen. List ; Sec. Lt. E. G. N. Grimble, Herts R., T.F., and to be secd. ; Sec. Lt. F. G. Lake, Herts R., T.F., and to be secd. ; Sec. Lt. T. G. G. Bolitho, Spec. Res. ; Sec. Lt. P. S. Kershaw, Spec. Res. ; Sec. Lt. H. F. Wright, Spec. Res. ; temp. Sec. Lt. N. McN. Beaton, Gen. List ; temp. Sec. Lt. H. E. Goody, Gen. List; Sec. Lt. F. C. Mears, Spec. Res., Jan. 29th.

Equipment Officers, 2nd Cl.—From the 3rd Cl. and to be temp. Lts. while so empld. :—Sec. Lt. C. F. Blunt, Spec. Res., Feb. 13th. Qrmr. and Hon. Maj. J. Liddle, T.F. Res., Feb. 25th.

Memoranda.—Sub-Lt. F. L. Atkinson, from R.N.V.R., to be temp. Lt. for duty with R.F.C., Feb. 13th.

C. J. Hallward to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Feb. 21st.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Sec. Lt. (on prob.) L. Sloden resigns his commn., March 6th.

Sec. Lt. W. O. Crowe is placed on ret. list on account of ill-health contracted on active service, March 6th.

TERRITORIAL FORCE.—R.H., R.F.A.—Sec. Lt. E. R. Bottomley is secd. for duty with R.F.C., Jan. 31st.

Sec. Lt. C. E. W. Chapman is secd. for duty with R.F.C., Feb. 4th.

Infantry.—Royal Warwick R.—Sec. Lt. (temp. Lt.) T. E. Salt is seconded for duty with the R.F.C., Jan. 31st.

Norfolk R.—Sec. Lt. (temp. Lt.) E. R. Kerrison is seconded for duty with the R.F.C., Jan. 28th.

Midd'x R.—Sec. Lt. L. L. Falck is seconded for duty with the R.F.C., Dec. 19th, 1916.

Cambridge R.—Sec Lt. C. H. Beldam is seconded for duty with R.F.C., Jan. 28th.

* * *

FROM THE COURT CIRCULAR.

Buckingham Palace, Feb. 27th.

The King and Queen, attended by the Countess of Airlie and Commander Sir Charles Cust, Bt., R.N., visited the Royal Flying Corps Hospital, 37, Bryanston Square, W., and the Birkett Military Hospital, 7, Mandeville Place, W., this afternoon.

* * *

Buckingham Palace, Feb. 28th.

The following officers had the honour of being received by the King, when His Majesty conferred upon them the Military Cross :

Capt. Ellert Forbes, Royal Warwickshire Regt., attd. R.F.C.
Capt. Leslie Forbes, R.F.C.
Capt. Raymond Grubb, Hussars, attd. R.F.C.
Capt. Charles Mackay, R.F.C.
Lieut. Richard Hilton, R.G.A. and R.F.C.

* * *

Buckingham Palace, March 3rd.

The following Officer had the honour of being received by the King this morning, when His Majesty invested him with the Insignia of the Order into which he has been admitted :—

The Distinguished Service Order.

Lt.-Col. Foster MacNeece, Royal West Kent Regt. and R.F.C.

The King then conferred decorations as follows :—

The Military Cross.

Maj. Eric Tyson, R.F.C.
Capt. Charles Miles, R.F.C.
Lt. Alick Todd, Durham Light Infantry, attached R.F.C.

NAVAL.

The following appointments have been made in the Royal Naval Air Service :—

March 1st.—Flt. Comdr.—J. J. Petree, D.S.C., reapptd. as Actg. Sqdn. Comdr., Feb. 27th.

Flt. Lts.—C. B. Dalison, J. D. Newberry, F. J. E. Feeney, R. G. Mack, C. T. Maclaren, E. W. Norton, A. D. W. Allen, B. C. Clayton, F. Fowler, C. C. R. Edwards, G. E. Harvey, and G. Thom, all reapptd. as Actg. Flt. Comdrs., Feb. 27th.

The following Proby. Flt. Sub-Lts. have been confirmed in rank with original seny. as stated :—C. K. Studd, July 10th, 1916 ; W. E. C. Parry, Aug. 26th, 1916 ; W. F. Foster, Jan. 24th ; H. S. Broad, W. B. Foster, R. B. Freeland, F. E. Banbury, P. Wood, D. L. Wilson, E. D. Roach, E. J. K. Buckley, and T. K. Thyne, all Jan. 25th ; A. R. Knight, G. H. G. Smyth, R. V. Knight, W. F. Cleghorn, M. O. Fairhurst, K. B. Preston, A. B. Ellwood, T. W. S. Harris, and H. L. Smith, all Feb. 1st ; H. L. Crowe, A. McB. Walton, T. A. Gladstone, E. Dickson, E. O. A. Andrews, F. I. Jacks, and E. B. Drake, all Feb. 7th ; A. L. Taylor, Feb. 9th.

Messrs. F. J. H. Ayscough, S. M. Bargeton, F. G. Redward, and L. Chivers, all entered as Flt. Officers (temp.), seny. of Feb. 27th, and apptd. to "President," addl., for R.N.A.S.

Mr. Ll. Lanchester granted a temp. commission as Lt. (R.N.V.R.), seny. Feb. 28th.

March 4th.—Mr. W. R. M. Griffiths, entered as Proby. Flt. Officer (temp.), seny. Feb. 22nd.

Temp. commns. (R.N.V.R.) have been granted as follows :—Lt.—R. Bisset and F. S. Wigley ; Sub-Lt.—G. C. Paish, all seny. March 2nd.

March 5th.—Flt. Lt.—W. G. McMinnies, apptd. Actg. Flt. Comdr., seny. Feb. 17th.

Flt. Sub-Lts.—J. S. Maitland and S. D. Scott, both apptd. Actg. Flt. Lts., seny. Feb. 12th.

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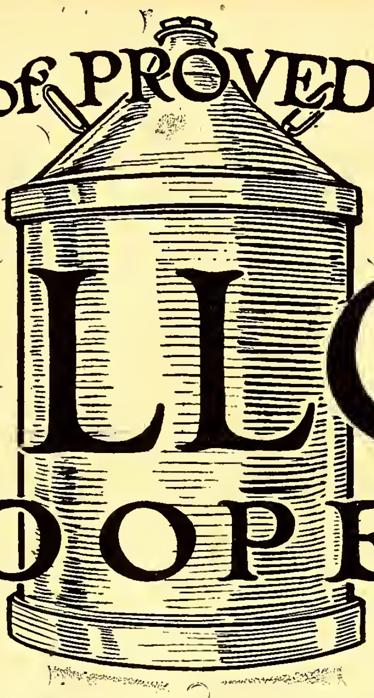

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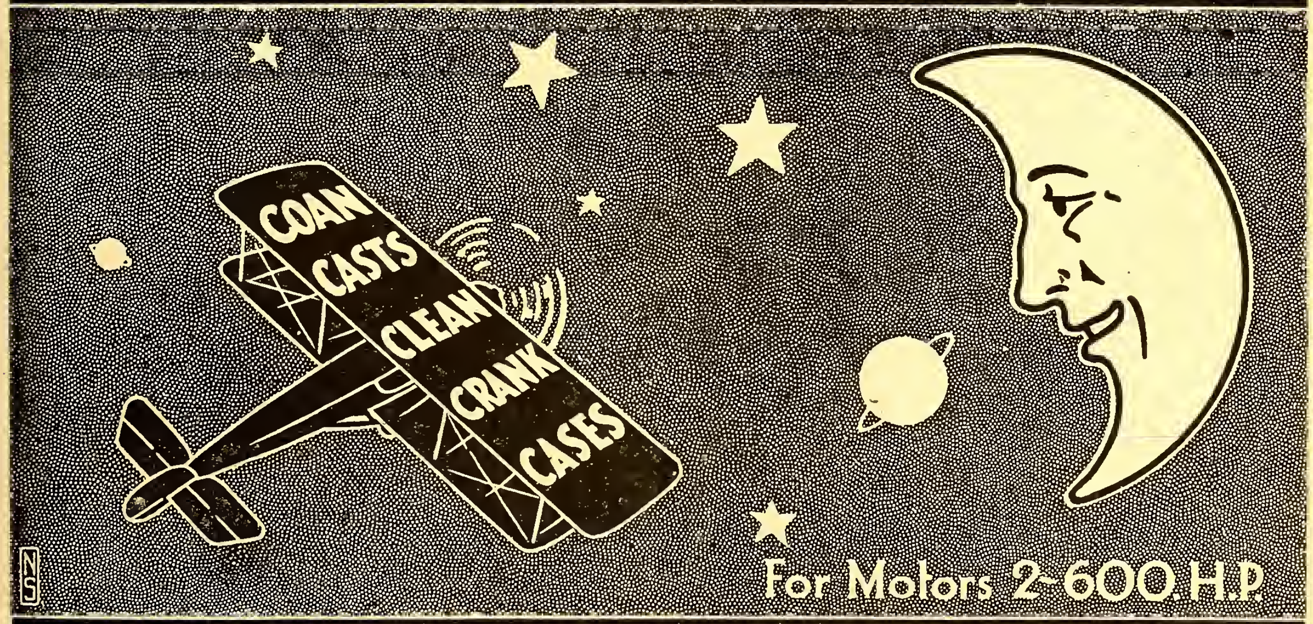

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Lt. (temp. R.N.V.R.).—W. E. G. Beauforte-Greenwood, to "President," addl., for R.N.A.S., March 3rd.

The following Proby. Flt. Officers (temp.) have been promoted to Flt. Sub-Lts. (temp.), seny. as stated:—W R. D. Acland, Nov. 15th, 1916; L. H. Slatter, Nov. 29th; H. W. Taylor and H. F. Stackard, Dec. 7th; and H. R. de Wilde, Dec. 27th.

Mr. S. K. F. P. Humphrey entered as Proby. Flt. Officer (temp.), seny. Feb. 24th, and apptd. to "President," addl., for R.N.A.S.

Temp. commissions (R.N.V.R.) have been granted to the following, seny. as stated:—Lt.—P. White, March 3rd. Sub-Lts.—S. D. Claris, Feb. 2nd; and H. R. G. Whates, apptd. to "President," addl., for R.N.A.S., March 3rd.

Admiralty Communiqué.

Feb. 28th.—On the 25th inst. a raid was carried out by a number of naval aeroplanes on the ironworks at Brebach (5½ miles E.S.E. of Saarbrücken. Several air encounters took place. One hostile machine was destroyed.

The Casualty List.

Reported March 5th.

Accidentally Killed.—Daglish, Flt. Sub-Lt. George R. G., R.N
Missing.—Smith, Flt. Sub-Lt. Lewis E., R.N.
Bysshe, Flt. Sub-Lt. Gordon T., R.N.
Wounded.—Edwards, Acting Flt.-Comdr. C. R., R.N.
Slightly Injured.—Ingram, Flt. Sub-Lt. Stanley F., R.N.
Creaghan, Prob. Flt. Sub-Lt. Gerald F., R.N.
Previously reported Missing, now reported Prisoners.—
Croft, Flt. Lt. John C., R.N.
Vereker, Flt.-Lt. Henry C., R.N.
Hibbard, Lt. Sidney R., R.N.V.R.

Reported March 6th.

Killed.—Pulling, Flt. Lt. Edward L., D.S.O., R.N.
Northrop, Flt. Sub-Lt. John E., R.N.
Snow, Mr. Edward R., Midshipman, R.N.

PERSONAL NOTICES.

Death.

PULLING.—Flight Lieut. Edward L. Pulling, D.S.O., R.N., whose death appears in the Casualty List published on March 6th, was an old boy of St. Anne's, Redhill. He was born in Devonshire, and before receiving his commission as Flight Sub-Lieut. in August last year was in the Government wireless service.

Lieut. Pulling, then Sub-Lieut., was awarded the D.S.O. last December for having, with Flight Lieut. Egbert Cadbury and Flight Sub-Lieut. Gerrard W. R. Fane, destroyed a Zeppelin off the Norfolk coast in the early morning of Tuesday, Nov. 28th, 1916.

The award of the D.S.O. appeared in the "London Gazette" on Dec. 5th in the following terms:—"In recognition of the skill and gallantry which he displayed on the morning of Nov. 28th, 1916, in pursuing out to sea, attacking at close range, and destroying a Zeppelin which had been engaged in a raid on England. Flight Sub-Lieut. Pulling was exposed to machine-gun fire throughout the attack."

In him the R.N.A.S. has lost a very gallant officer and skilful pilot, whose death will be deeply lamented by all who knew him.

Marriage.

BROMET—RATLIFFE. — On Feb. 26th, at Holy Trinity, Leamington, by the Rev. C. Brookes, assisted by the Rev. C. B. McNulty, vicar of the parish, Squadron Commander G. R. Bromet, R.N., son of Mr. and Mrs. G. Bromet, Tadcaster, Yorkshire, was married to Margaret, eldest daughter of Lieut.-Col. R. and Mrs. Ratliffe, Lillington, Leamington Spa.

MILITARY.

G.H.Q. Communiqués.

Feb. 28th, 9.10 p.m.—Much valuable reconnaissance work was carried out by our aeroplanes yesterday, and a number of air fights took place. Three of our machines were brought down.

March 3rd, 9.25 p.m.—Successful trench reconnaissances were carried out by our aeroplanes to-day. One of our machines is missing.

March 5th, 8.58 p.m.—Yesterday there was considerable activity in the air, and many combats took place. In the course of the day six hostile aeroplanes were brought down, two falling within our lines, and eight were driven down damaged. Two of our machines were brought down and five are missing.

Useful artillery and reconnaissance work was carried out. Many places of military importance were attacked with bombs.

War Office Communiqué.

The following communiqué was issued by the Field-Marshal, Commanding-in-Chief, Home Forces, at 12.50 p.m. on Mar. 1st:

At 9.50 a.m. to-day a hostile aeroplane dropped some bombs at Broadstairs. One woman was slightly injured.

The Casualty List.

Reported March 1st.

Killed.—Ball, Sec. Lt. A., R. Lancaster R., attd R.F.C.
Missing.—Fairbairn, Sec. Lt. J., R.F.C.
Missing, believed Prisoner in Bulgarian Hands.—Owen, Lt. J. C. F., Can. A.S.C., attd. R.F.C.
Killed.—R.F.C.—Tooms, 1678 Sgt. C S. (Northampton).

Reported March 2nd.

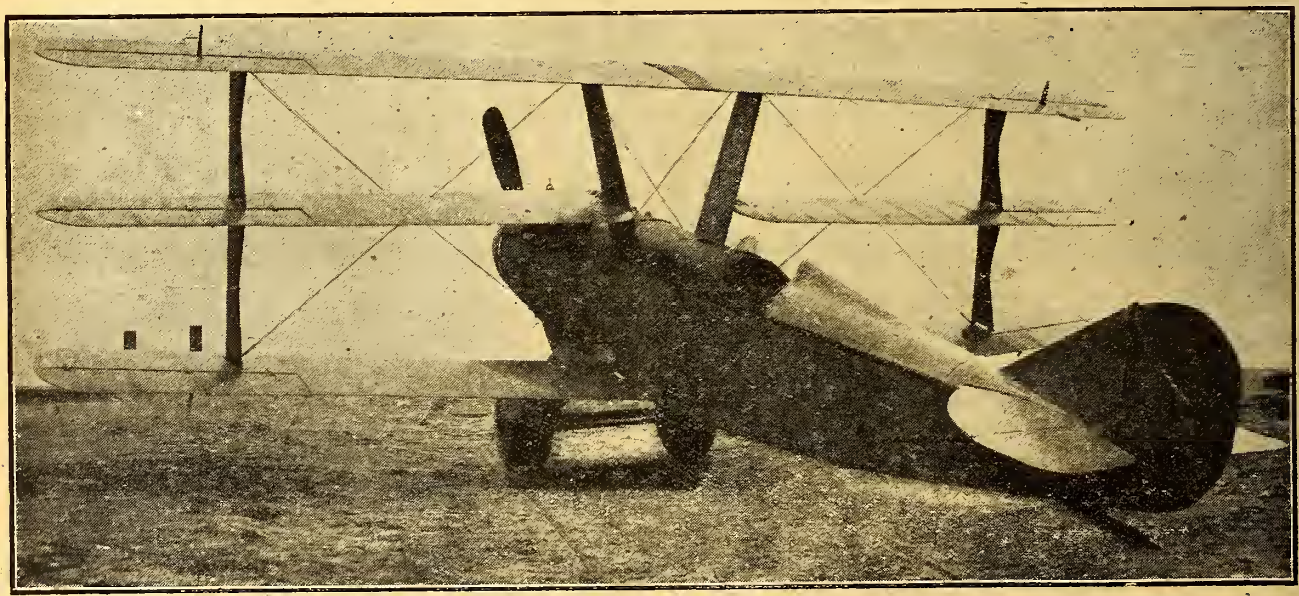
Missing.—Lindley, Sec. Lt. E. W., Manchester Regt. and R.F.C. R.F.C.

Reported March 5th.

Killed.—Baines, Lt. J. G. B., R. Warwick R., attd. R.F.C.
Wounded.—Brown, Sec. Lt. L. L., R.F.C.
Ferguson, Lt. J. F., Canadian Pioneer Bn., attd. R.F.C.
Accidentally Killed.—R.F.C.—Barnard, 3363 Sjt. J. V. (Sparkbrook).

Reported March 6th.

Died of Wounds.—Jack, Sec. Lt. R. L. M., Gord. Highrs. and R.F.C.
Wounded.—Bagot, Lt. H. E., R.F.C.
Carter, Sec. Lt. L. L., R.F.C.
Lund, Lt. R., R Berkshire R., attd. R.F.C.
Morgan, Sec. Lt. A. M., R.E., attd. R.F.C.
Previously reported Missing, now reported Killed.—R.F.C.—Fleming, 14454 Cpl. R. D. (Carmunnock).
Webb, 191 Flt. Sgt W. G. (Kilburn, N.W.).



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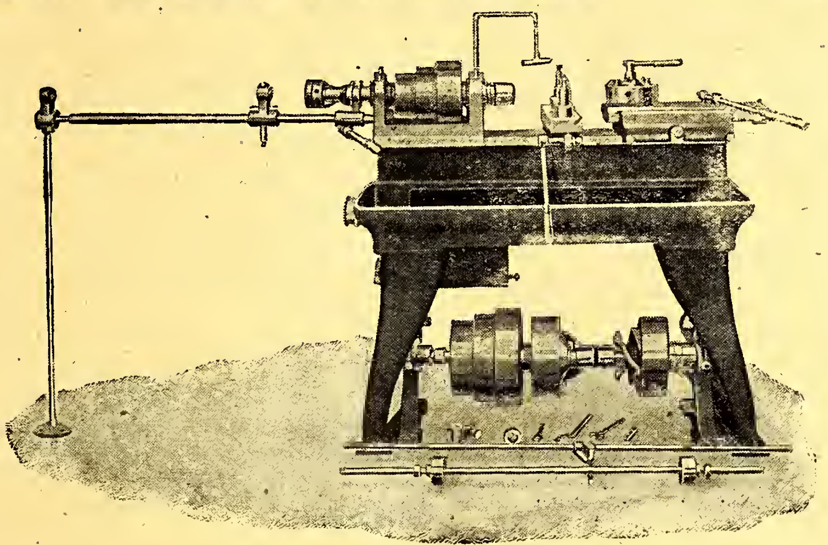

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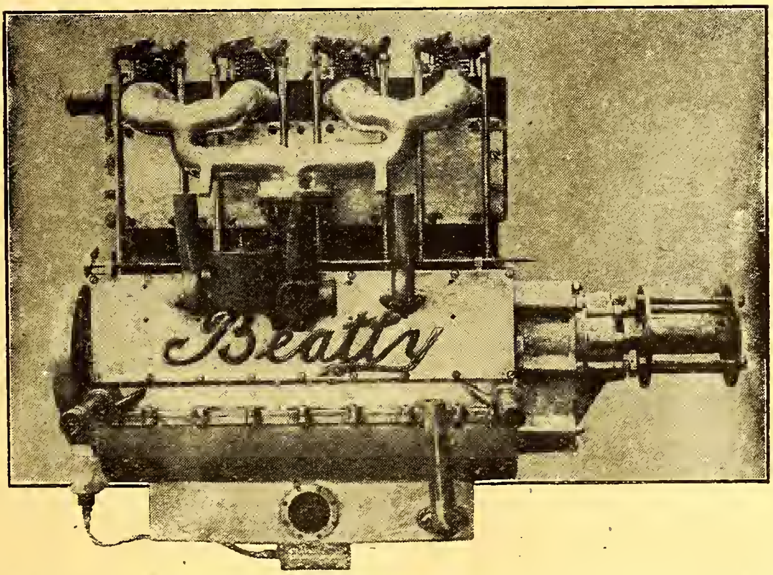

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PERSONAL NOTICES

Deaths.

BAINES.—Sec. Lt. Jack G. B. Baines, Royal Warwickshire Regt., attached R.F.C., was killed in action in France on Feb. 25th. He was the eldest son of Captain Louis Campbell and Lilian Baines, of The Croft, Bacton, Norfolk, aged 19.

* * *

BAYLEY.—Sec. Lt. Edward Vincent Bayley, South Staffordshire Regt., attd. R.F.C., whose death is reported as the result of an accident while flying abroad, was a member of Keith, Bayley and Reader, of the Stock Exchange. The second son of Mr. James Bayley, of Willaston Hall, Cheshire, he joined the South Staffordshire Regt., and six months ago was attached to the R.F.C. He was a keen sportsman, being a first-rate shot and horseman.

* * *

BUCK.—Charles Melvill, Indian Cavalry, attached R.F.C., previously reported missing, now unofficially reported killed on Jan. 24th. He was the only son of E. J. Buck, Simla, India, and of Mrs. E. J. Buck, The Chilterns, Marlborough Road, Bournemouth, and grandson of General Sir Robert Jennings, K.C.B., I.A. His age was 21 years and 11 months.

* * *

COX.—Sec. Lt. H. B. H. Cox, R.F.A. and R.F.C., the youngest son of Mr. G. W. S. Cox, J.P., of the Indian Police (retired), was accidently killed on Jan. 29th, while flying in England, owing to an accident to his machine. He was just about to proceed to the advanced part of the pilots' course. He was educated (1905-13) at Bedford School, where he distinguished himself by his ability and vigour, not only in work and games, but as C.S.M. in the O.T.C., and as head of the school. In 1913 he accepted an appointment at Selangor. On the outbreak of the war he returned to England, and was nominated to Woolwich. In 1915 he passed out into the Artillery, but was soon afterwards selected for the R.F.C. He was on active service in France for 10 months, and did excellent work in the region of the Somme, when he won the commendation of his superior officers for his coolness and determination.

* * *

DAMANT.—A. M. Henry Kirkpatrick Damant, R.F.C., son of Mrs. and the late H. C. Damant, of Cowes, died of pneumonia on Feb. 26th at Tidworth Military Hospital. He was 28 years of age.

* * *

GREEN.—Lt. Thomas Seaman Green, R.F.C., was killed in action on Feb. 13th, 1917. He was the elder son of Mr. and Mrs. T. S. Green, of Burslem, Stoke-on-Trent.

* * *

MAULE.—Lt. Edward Barry Maule, H.L.I., attached R.F.C. previously reported missing, was killed in action on Feb. 6th. He was the younger son of Mr. and Mrs. Percy Maule, The Views, Huntingdon, and was 24 years of age.

* * *

NEEDES and LIDDLE.—Lieut. C. M. Needes and Sergt. Liddle, of the R.F.C., were killed on the evening of Feb. 27th by the fall of an aeroplane in which they were making a flight. The machine caught fire while in the air, and fell into a moat. Both the occupants were dead when taken from the wreckage.

A verdict of accidental death was returned at the inquest on March 1st. The evidence showed that pieces were seen to fly from the machine, which crashed to earth enveloped in smoke, and alighted bottom upwards, both occupants being dead when extricated.

* * *

PERRATON.—At the inquest on the body of Lt. Frederick Arnot Perraton, aged 27 years, of the R.F.C., who met with a fatal accident when piloting a biplane on March 1st, it was stated that he might possibly have fainted and fallen forward on the controls, which would cause the machine to make a nose-dive. A verdict of accidental death was returned.

Before joining the Forces Mr. Perraton was a law student at Edington University, Alberta, Canada.

* * *

PORKESS.—Lieut. Walter A. Porkess, R.F.C., youngest son of Mr. U. Porkess, builder, of Grimsby, has been killed on active service. He was on the staff of Messrs. Ambrose Heal and Son, Tottenham Court Road, W., whence he enlisted soon after the outbreak of war. After six months in the ranks of the Royal Bucks Hussars, he was transferred to the Inns of Court O.T.C., and later received a commission in the Sherwood Rangers Yeomanry, from which he went to the R.F.C. Here he made rapid progress, and won his "wings" in a very brief time, and was soon sent over to France on active service. After six months of strenuous flying he came over for Christmas leave. He returned early in January.

* * *

RUSSELL.—Sec. Lieut. F. Gerald Russell, R.F.A. and R.F.C., eldest son of Hubert H. Russell, late 8th The King's Regt., was educated at Elmhurst, Torquay, and at Tonbridge School. In 1914 he went to New Zealand sheep-farming, but on the outbreak of war he enlisted in the New Zealand Mounted Rifles, and was sent to Egypt, where he was promoted sergeant.

Soon after he obtained a commission in the R.F.A., and went to France, where he transferred to the R.F.C., and became a qualified observer. He was wounded in an air fight in April, 1916, and afterwards gained his pilot's certificate and "wings." Returning to the front in November, 1916, he was killed on Jan. 28th, 1917, while flying.

His commanding officer writes :—"Your son endeared himself to all of us, and was very popular with the men. He was a very good pilot, and I can ill afford to lose such a good all-round officer. He is a very great loss to me. A most gallant fellow, and he has died a glorious death."

* * *

RUSSELL.—Sec. Lieut. Lawrence D. Russell, R.F.C., youngest brother of Sec. Lieut. F. G. Russell, was educated at Wanganui School, New Zealand, and at Wellington College, England, where he was in the shooting VIII, and gained the prize cup of his year, 1914. He obtained a commission in the R.F.C. in April, 1916, and in three months became an expert pilot and gained his "wings."

He was at once sent to the front, and after four weeks of most successful work was shot down by a shell, which killed his observer. He managed, however, to bring his machine to the ground, but his own injuries were so severe that he died in hospital a week later, on September 2nd, 1916, aged 18. The only surviving son, Lieut. H. B. Russell, R.F.A. and R.F.C., also a pilot, is a prisoner in Germany.

* * *

SHEPPARD.—Lieut. A. F. Sheppard, R.F.C., has died of injuries sustained in an accident while flying on Feb. 21st. At the inquest before a South Coast coroner on Feb. 27th, it was stated that the machine in landing struck the ground at too great an angle, and turned over.

* * *

SLATTERY.—An inquest was held by the East Kent coroner on March 5th, respecting the death of Sec. Lieut. V. Slattery, Hampshire Regt., attd. R.F.C. It was stated that the petrol tank burst, and the aeroplane in which he was flying nose-dived to the ground, the officer being killed instantaneously. A verdict of accidental death was returned.

* * *

SUTHERLAND.—An inquest was held on March 1st on the body of Sec. Lt. Allen D'Arcy Sutherland, R.F.C. (S.R.), aged 26, of the London branch of the Commonwealth Bank of Australia. He left his aerodrome at about 8 a.m., and rose to 1,000 ft. He was seen to dive towards another machine which was considerably below him. When he had nearly reached the same level he tried to straighten his machine too quickly, with the result that the right wing crumpled up. The left wing subsequently gave way and the machine nose-dived to earth.

* * *

THOMAS.—Sec. Lt. James Leonard Thomas, London Regt., attached R.F.C. (accidentally killed whilst flying at Netheravon on Feb. 28th), was fourth son of the Rev. S. Thomas, former vicar of Rushton, Staffordshire, and of Mrs. Thomas, Abingdon Road, Oxford. He had his commission in December, 1914.

* * *

THOMPSON and LINCOLN.—A verdict of death through immersion in the sea was returned at an inquest held at Dover on Feb. 28th, on the body of Sergt. W. P. Thompson, an observer, picked up in the Channel. He and an aviator named Lincoln were flying to France, but after leaving the coast they apparently came down and were lost. Mr. Lincoln has not yet been found. A letter on the deceased to his mother stated that he had just been promoted sergeant.

* * *

VAUGHAN-JONES. — Lieut. Gerald Vaughan-Jones, R.E., attached R.F.C. (killed in action on Feb. 26th), was youngest son of the late Colonel Edward Vaughan-Jones, V.D., of Hampstead, and of Mrs. Vaughan-Jones, of Myrtleberry, Pinner, Middlesex. He had his commission in the Engineers in October, 1915, and was gazetted flying officer in November last year.

* * *

WAKEFORD.—Sec. Lt. Robert Scott Wakeford, R.F.C., died on Feb. 22nd. at No. 1 Military Hospital, Reading. He was the eldest son of Robert and Elizabeth Wakeford, of Tilehurst, Reading, and was 38 years of age.

* * *

WHITE.—An inquest was held on March 1st on the body of Sec. Lt. Harold Tom White, aged 21, of Spencer Road, Southsea. He was flying at a height of about 800 ft. when he was seen to make a spiral descent to about 400 ft. After going straight for a short distance he turned sharply to the left, and the machine made a spinning nose-dive to earth. The pilot was killed instantaneously.

Engagement.

DARWIN—ROSE.—The marriage arranged between Captain C. J. W. Darwin, Coldstream Guards and R.F.C., and Miss Sibyl Rose will take place in the middle of April.

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Marriages.

ANDERSON—WIGG.—On March 1st, at St. Peter's Church, Leicester, by the Rev. Ambrose Lethbridge, M.A., Guthrie Newcome Anderson, Lt., Yeomanry and R.F.C., son of the late Dr. and Mrs. Anderson, of S. Wigston, was married to Marjorie, daughter of Mrs. and the late John Wigg, of Leicester.

* * *

BOUSTEAD—HUSEY-HUNT.—On Feb. 27th, at the Chapel Royal, Savoy, by the Rev. F. Haines, assisted by the Rev. P. Boustead, uncle of the bridegroom, Capt. Cedric Boustead, Middlesex Regt., attd. R.F.C., third son of John Melvill and Leila Boustead, of Westfield, Wimbledon Common, and of Colombo, Ceylon, was married to Dorothea Joyce, only child of Mr. and Mrs. Husey-Hunt, of Hove, Sussex.

* * *

QUICK—PURSER.—On Feb. 28th, at St. Mark's Church, Torquay, by the Rev. Preby Statham, Rector of the Parish, Lt. J. T. Quick, Devonshire Regt. and R.F.C., was married to Doris Mary, elder daughter of Alfred J. Purser, Esq., 12, Prospect-place, Moseley, Birmingham.

* * *

WADHAM—MAY. —The marriage arranged between Lieut. Nicholas Wyndham Wadham, Rifle Brigade and R.F.C., eldest son of J. C. Wadham, 5, Cleveland Terrace, Hyde Park, W., and Barbara, only daughter of Mr. and Mrs. F. Morley May, of Brendon, Weston-super-Mare, took place quietly at Birmingham on Feb. 27th.

Births.

BARRATT.—On Feb. 26th, at Witham, Essex, Nora (*née* Crew), the wife of Major A. S. Barratt, R.F.C.—a daughter.

* * *

NICHOLSON.—On Feb. 16th, 1917, at 13, Foster Road, Alverstoke, the wife of Lieut. B. J. Nicholson, R.F.C., of a son.

Captain A. de B. Brandon, D.S.O., the officer who was concerned with bringing down the first Zeppelin sunk in British territory, met with a serious accident on Mar. 1st near Dorking. Flying to Farnborough, he encountered fog, and struck the top of a tree. The aeroplane came to earth, the pilot sustaining serious fractures of the right leg. He was removed to the neighbouring Officers' War Hospital.

* * *

Lieutenant Henry Eric Bagot, R.F.C., wounded, is the eldest son of Mr. Charles F. H. Bagot, Rochford House, Tenbury, and is a kinsman of Lord Bagot. He was born in 1893, and his first commission was in the Royal Artillery, but subsequently he went into the R.F.C., in which he has been a lieutenant since last October.

* * *

A "Times" correspondent writing from General Headquarters, France, on Mar. 1st, says:—

"The one subject of conversation from end to end of the British front, not only day by day, but hour by hour, is how much farther have they gone back.

"To-day there has been excellent opportunity for observing the extent of the direction of the German retirement. The weather has been very fine, with bright sunshine, an easterly wind, and a clear atmosphere. Our aviators have naturally taken the fullest advantage of these favourable conditions and, in spite of the counter-activity of the hostile planes whose occupants undoubtedly had instructions to spare no effort to 'blanket' our men, they have gained much valuable information."

FRANCE.

Official Communiqués.

Mar. 2nd.—Yesterday evening two German aeroplanes dropped bombs on Montdidier. One woman was killed, and two children and a man were wounded.

One of our air squadrons, composed of 11 machines, bombarded the hutments of Guiscard, the railway station of Appilly (respectively north-east and east of Noyon) and the railway station of Baboeuf (west of Appilly) where a fire was seen to break out.

During the night an enemy aeroplane dropped some bombs on the outskirts of Compiègne. Only slight material damage was done.

March 4th.—On the night of March 3rd our bombarding squadrons dropped bombs on the hangars of Frescaty (south by west of Metz), the powder factory of Bous (near the German-Luxemburg frontier), on the blast furnaces of Wölfling (district of Sarrebrück), and on the railway station of Delme (south-east of Metz).

Army of the Orient.—Since Feb. 22nd our aviators have been particularly active.

March 5th.—During the day two German aeroplanes attacked by our pilots were brought down—one in the region of Autrécourt (Meuse), the other near Nampcel (Oise). A third machine was brought down to the north of Burnhaupt (Alsace) by the fire of our special guns.

GERMANY.

Official Communiqués.

Feb. 28th.—One of our seaplanes successfully dropped bombs on a hostile transport steamer in the Northern Ægean.

March 3rd.—In the forenoon of March 1st our seaplanes dropped 21 bombs on steamers lying in the Downs and on the railways and port of Ramsgate, with visible effect. All the machines returned safely.

March 5th.—In the very numerous air fights which occurred the enemy lost yesterday 18 aeroplanes, one of which was brought down from the ground. Our loss amounts to four aeroplanes.

* * *

The "Matin," Paris, of March 2nd, says:—

"Some weeks ago the news agency published telegrams from Zurich stating that Germany had given up the use of Zeppelins, having come to the conclusion that these airships ran great risks which were out of all proportion to the damage they were able to effect. These reports must be received with great reserve.

"Four Zeppelins have just been completed at Friedrichshafen, and are awaiting orders to leave that place. Moreover, at the little town of Mauzol, not far from Friedrichshafen, fresh building yards have been constructed, comprising immense two-storey workshops entirely underground, and thus completely sheltered from aerial attack.

"The Zeppelins at present available are concentrated a short distance from the Dutch frontier, and the Germans intend to use them in the course of a few weeks for an expedition on a large scale against Great Britain."

[See The Aeroplane of recent dates.—Ed.]

RUSSIA.

Official Communiqués.

Feb. 27th.—Our pilot Sub-Lieut. Efimoff three times entered into combat with a German machine which appeared over the town of Dvinsk. He compelled it to descend into the German lines.

March 5th.—Our artillery brought down south-west of Lutsk an enemy aeroplane, which fell in flames. We captured the aviators.

ITALY.

Official Communiqués.

Feb. 27th.—Enemy aviators dropped bombs on the Vallone (Carso). A few persons were injured.

Feb. 28th.—Enemy aeroplanes dropped some bombs without any result on Gorizia and on the Vallone. One of our air squadrons successfully bombarded the enemy's billeting areas in the neighbourhood of Serrada, on the Folgaria plateau (Upper Astico).

Mar. 1st.—Enemy aeroplanes dropped several bombs on Gorizia; four men were wounded. Several other raids were repulsed by our chasers. Two hostile aeroplanes were hit by the fire of our anti-aircraft batteries. One was brought down in the neighbourhood of Boscomalo (Carso), the other fell north of Duino (Gulf of Trieste).

Mar. 2nd.—Enemy aeroplanes dropped bombs on Gorizia and in the Vallone. No damage was done. Our aeroplanes successfully bombarded the enemy's line of communication.

March 3rd.—Some of our aeroplanes dropped bombs on the enemy's rear lines on the Carso.

ROUMANIA.

Official Communiqué.

Feb. 28th.—Two enemy aeroplanes which were manœuvring above our positions in the region of Racoaso (on the Susitza) were driven off by our aeroplanes after a short engagement.

TURKEY.

Official Communiqué.

Feb. 27th.—On Feb. 26th an enemy biplane was brought down by one of our aviators near Lemnos, the machine falling into the sea.

BULGARIA.

Official Communiqué.

Feb. 26th.—Macedonian Front.—Lively aerial activity in the valley of the Vardar and on the Orfano coast. A French aeroplane was brought down in an air fight south of Ghevgheli.

MACEDONIA.

It was reported from Athens on Mar. 1st that a Salonika message stated that Serbian aeroplanes successfully bombarded the enemy encampments on Feb. 28th. French aeroplanes bombarded the enemy aerodrome at Hordovo.

British aeroplanes blew up a powder magazine at Lournika, in the Vardar valley. A number of enemy aeroplanes flew over Salonoppo, Feb. 28th. A German aeroplane was brought down near Houmenitza, and the German pilot was captured.

It was reported from Salonika on Feb. 27th that the Germans have been making aeroplane raids on a larger scale the past few days than for some time past. Janesh and the Karasuli villages near the front have been bombed, and that afternoon 15 Albatroses, profiting by a haze, appeared over the Allied camps around Salonika and dropped large bombs,

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Causes and Effects of Fog.

On February 28th a special meeting of the Aeronautical Society of Great Britain was held at the Royal Automobile Club, where a paper was read by Major G. I. Taylor, R.F.C., of the Meteorological Office, the subject of his discourse being "Fog Conditions."

Brigadier-General W. S. Brancker, R.A., was in the chair. In introducing the lecturer in a few brief words General Brancker spoke of his experience as a meteorologist, also of his knowledge of aerodynamics, mathematics and flying. He explained that Major Taylor had spent six months under Sir Napier Shaw in studying meteorology as applied to aviation, and had devoted very special attention to the prediction of fogs. He related that when Major Taylor had asked leave to fly objections had been raised that his services and knowledge were too valuable to risk in an aeroplane. Here General Brancker disagreed, because he argued that the necessity for winning the war required us to combine theory and practical experience without regard to risk.

The Lecture.

Major Taylor confessed to the possession of but a superficial knowledge of fog conditions until he started upon the course of special research. Like everyone else he knew that fogs came in calm weather, usually after fair nights with a clear sky. He also remarked that there was little apparent difference between clear nights followed by fog and clear nights followed by an absence of fog.

The literature on the subject of fog was very unconvincing and indefinite, and during his course of research he had endeavoured to combine theoretical reasoning with practical observation and common sense. He thought that the causes of fogs were far too complicated for prognostication to become an exact science.

As regards ground fogs, they might be divided into two classes—namely, those in which small particles fell slowly, and those in which larger particles fell more quickly, but were continuous in supply. This latter class was represented by sand storms and fine rain, neither of which were of very great interest to aviators—sand storms of importance not occurring in this country, and fine rain occurring with low clouds, in which latter case there was not likely to be any flying.

He therefore proposed to confine himself to the first class, which in its turn might be divided into two categories, namely, smoke, and small drops of water suspended in the air, or both together.

Conditions favourable to fog formation were: a very light air or entire absence of wind and a condition of the air which prevents vertical currents.

The condition which prevents the formation of vertical currents is when the surface of the ground is cool relatively to the air.

Smoke Fog.

Major Taylor then showed a lantern slide of a photograph taken by him from a whaler in the North Atlantic during an expedition for meteorological research some years ago. The photograph showed the smoke from the furnace of the whaler stretching across the sea from the stern of the boat. The conditions were favourable to the formation of a local fog because the ice-strewn sea was considerably cooler than the air.

The second picture taken about half an hour later, when the vessel had changed her course, showed a long belt of smoke left behind, which had maintained a constant altitude of about 80 feet above the surface of the water, and had remained in a thin layer, having no tendency to spread upwards.

In summer time, when the temperature of sea and air, and more especially of land and air, is more nearly equal such smoke will rise and disperse.

A light wind aloft may allow smoke to stay in the upper regions. Last summer at Farnborough, on an occasion when the sky was so hazy as almost to obscure the sun, and the wind was blowing from the north-east, he had gone up in an aeroplane to 7,000 ft. and found a thick smoke fog at that height which had obviously come from London.

Water Vapour Fog.

The most frequent cause of fog, however, was water vapour, the chief factor being the relation of temperature to vapour pressure. As air can only contain a definite amount of water vapour at any given temperature, the quantity rising with the temperature, the effect of a fall of temperature upon air saturated with water is to precipitate fine water particles, resulting in fog. The particular degree of heat where moisture is precipitated is known as dew point. Nevertheless it is quite possible for a cold ground surface to precipitate moisture, in the form of dew, without a fog resulting, as the air above the ground then becomes drier.

Major Taylor considered the processes which may produce fog. When air is compressed heat is created, and *vice versa*, and therefore expansion of air resulting in a diminution of pressure produces clouds.

Fog is created on high ground such as mountain-tops through damp rising from valleys and chilling as it ascends. As this type of fog was distinctly related to clouds the lecturer did not think it immediately interested aviators.

[In view of the highly mountainous country which has to be negotiated by the pilots in such countries as the Balkans and elsewhere one would have imagined the point to have been of vital interest.—Ed.]

The chief factor which determined fog was the relative temperature between the air and the land, or between the air and the sea. In the latter instance change in temperature was very slow, the chief cause being a certain amount of radiation of the heat in the air and the sea.

In the case of land the temperature changed very rapidly, the daily radiation being rapid, and great differences in temperature were experienced every day and night. The stability of the temperature at sea made it relatively easy to predict fog by a study of the wind paths, which were naturally nearly related to the water currents.

The lecturer showed a map of the areas off Newfoundland, showing the varying temperatures created by the Gulf Stream, and their effect in the creation and dissipation of fog. He estimated that the fogs off Newfoundland only reached to about 700 metres (roughly 2,300 feet). [Incidentally, for a mathematician, some of the lecturer's mental arithmetic in turning metres into feet seemed a trifle at fault—120 metres is rather more than 200 feet.—Ed.]

The lecturer then showed a table of fogs which had been recorded at the Kew Observatory for a period of years, and admitted that such readings and observations were only taken from 9. a.m. onwards. As people at Kew only got up at that hour they missed fogs which dispersed earlier, and so the value of the record was considerably impaired.

Of these fogs 62 were formed in winds of 3.3 miles per hour or under; 5 in winds of 3.3 to 5.5 miles per hour. [Under the circumstances it scarcely seems worth while to have used such data. As regards the wind speeds, it would be interesting to know the type of instrument which gives such accuracy at such low speeds, and whereabouts it was situated in relation to the ground.—Ed.]

Major Taylor said that these figures seemed to prove that fog was formed at night locally, and was found in the same spot in the morning.

He concluded by showing some diagrams illustrating the effect varying temperatures and pressures had upon the dew point, and admitted that at any rate there were hopes of predicting fogs by scientific methods with some chance of success.

The Discussion.

General Brancker, in opening the discussion, said that he considered the most hopeful point was the relative shallowness of fog, and trusted that scientists would ultimately be able to penetrate fog by the use of special lighting apparatus. He said that he was more particularly concerned with the solution of the problem because he was a great believer in aviation from the commercial aspect, and had tried to drum it into financiers. He was always told that the weather would defeat us. Fog is the only weather condition which still remained unconquered. Fog prediction and, if possible, dispersal are two vital points as regards the possibility of commercial aviation, especially in England, with its abominable climate.

He stated that this is the first time that meteorology has been represented in war. Eminent meteorologists were at work at the Front with the Royal Engineers, predicting weather in relation to gas attacks, and endeavouring to predict the occurrence of fogs not only for the benefit of aviators, but as regards their effect upon ordinary warfare.

Pilots were apt to mistrust the meteorologist, and he thought that every meteorologist should be a pilot. The science was so closely bound up with aerial navigation that too much study could not be devoted to it. This was the first occasion on which pure meteorology had been discussed by the Aeronautical Society in its relation to aviation.

Lieut.-Colonel Higgins, D.S.O., who explained that he had not come prepared to make a speech, spoke of wet and dry bulb thermometers which have been experimented with at the Front in endeavours to predict fog. Experiments were inconclusive chiefly because the cold weather arrived at the same time as the instruments, and froze the wet bulb thermometers.

He thought that in the Home Defence Wing, Squadron Commanders and Wing Commanders should be in as good a position as possible to predict fog in order to decide whether they were justified in sending up aeroplanes to look for Zeppelins without unwarrantable risk to the pilots concerned. If the fog was thick they should not send pilots up. So far as he knew no satisfactory apparatus for penetrating fog had been discovered. The most useful thing was the petrol flare of the type originated by Major Holt.

One one occasion a pilot had seen a large bon-fire in a thick fog at an altitude of 5,000 feet, and on coming to within 500 feet

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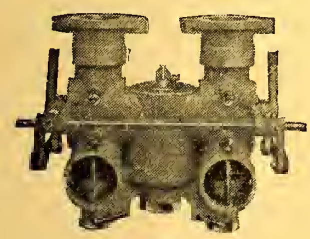

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of the ground he had been able to detect petrol flares laid out round the aerodrome. He had found that electric lights and magnesium flares used on aeroplanes were rather worse than useless. Naphtha flares were quite good, but not large enough.

Mr. Charles Bright, F.R.S.E., M.I.C.E., asked whether the general condemnation of electric light included the yellow flame arc light which he believed had special qualities for penetrating fog.

[One seems to remember a reference to this light in one of Mr. Bright's Recommendations published as Addenda to the Report of the Air Inquiry Committee published on Dec. 20th last.—Ed.]

Sir Napier Shaw testified to Major Taylor's profound knowledge of fog conditions, and explained that he knew more about fog than anyone on this planet owing to his six months' experience with the expedition off Nova Scotia. During that expedition he had ascended in his man-lifting kite through the fog on ten occasions, although other people had considered it impossible to use a kite under fog conditions.

[Kites can be towed, and a sea-fog frequently occurs in a strong wind, so why the implied doubt?—Ed.]

He believed that every meteorologist ought to have practical experience of air conditions, and hoped that in return some pilots would endeavour to become meteorologists.

[The average experienced cross-country pilot knows rather more about meteorology than the average meteorologist appears to know.—Ed.]

He spoke at some length of the phenomenon of the "Lid," which, he alleged, occurred over a fog. He stated the proposition that if a permanent fog occurs Nature has put a lid on it, and he appeared somewhat puzzled to explain why under certain conditions the temperature of the air should be colder low down than higher up.

He spoke of a friend experiencing the excitement of descending onto one of those "lids" in a balloon, whereupon the balloon rebounded three times in succession, and seemed to doubt the phenomenon. He considered the existence of this "lid" was essential to the preservation of a fog.

[To the unscientific mind the stability of a fog would appear to be more a question of equilibrium. Air in or under a cloud is necessarily colder and denser than air above, consequently a balloon descending onto a cloud meets denser air, and is squeezed up out of it again.—Ed.]

Wing-Captain Groves, R.N., testified to the danger of fog to pilots, and said that he had lost eight or ten machines in a month through this cause. At Dunkirk fog came on an hour after sunrise, caused apparently by the meeting of land and sea breezes. Pilots returning from raids could see the ground through the fog from 1,000 feet, but lost sight of it when fairly in the fog itself. He had therefore tried bonfires and also acetylene flares spaced along a flat beach at considerable extent. There were 40 miles of such beach between Calais and Ostend, but the east extremity of it was unhealthy. He had also used kite balloons rising up through a fog to indicate the locality of the landing place. Also, pilots learned to know, by the formation of the clouds, whether they were over sea or land.

He thought well of the suggestion for the employment of flame arc lights. Personally he had not been able to employ them as they were not then available. He also thought there was a future for exceptionally powerful searchlights for fog penetration, and spoke with feeling of a new searchlight invented by the Germans which gave eight times the usual amount of light for a given amount of current.

M. le Commandant Bernard, Adjutant of le Bourgêt aerodrome, organised for the defence of Paris against Zeppelin attack, said that they had not been more successful in penetrating fog there than we had in London. Round Paris fogs were often experienced a thousand metres high. Kite-balloons with searchlights were used as a light-house to guide pilots home, and rockets also, when fog was not too deep.

His most successful effort had been to seek for ground within 50 miles of Paris where fog but rarely occurred, and at the most likely places landing-grounds were laid out, so that if there was fog at one there might not be at another. At nights when fog was reported, and when the necessity for aeroplane patrols arose, it was customary for the Anti-Aircraft Batteries to fire a series of star shells up through the fog to mark the direction of the landing-ground.

Lt.-Col. Mervyn O'Gorman, C.B., said he had little to say on the subject because he did not profess to know anything about it, except that Major Taylor had worked with him for a matter of 18 months, and he had naturally been interested as a spectator in his efforts. He thought that if a sufficient number of observation stations in England were established, fog areas could be indicated to pilots by telegraph before their ascent.

[A very sound suggestion, and one in which Observer Companies might well co-operate.—Ed.]

He suggested that if night fogs were local they were due to local air, and so to local ground, and therefore the most satisfactory way to abolish fogs in any given area, in view of its local origin, would be to dry the ground. He did not know whether this was possible, but suggested the experiment of tarring an aerodrome.

[Apparently the Germans do something rather in this direction by boarding over their landing places and putting electric lights under the boards, which thus give light through the cracks, melt any snow that may fall, and set up warm vertical currents, which might possibly clear a light mist, if not a thick fog.—Ed.]

He pointed out that the difference in value to the nation between a good meteorological year for corn and a bad year was greater than the cost of the South African War, so the interest on £300,000,000 might be expended with advantage in driving clouds from where they were not wanted to where they were wanted.

[A highly ingenious idea, and one which may yet be carried out.—Ed.]

Major Taylor replied that he was most interested in the arrangements made by the French Government to minimise fog risk. Personally, he had not discovered a fogless place in England, but it was possible that the ground had not been entirely covered.

As regards Colonel O'Gorman's suggestion, he mentioned the French custom in the agricultural districts of causing a premature cloud burst by firing guns into the air, an expedient which might result in one agriculturist bringing down undesired rain on a neighbour's land.

[One suggests a study of the use in Austrian vine districts of fixed vortex guns as cloud breakers. Experiments with the acetylene vortex gun tried by an officer of the R.N.D. might be studied with advantage also.—Ed.]

In thanking the lecturer, General Brancker said that aviation had opened the gates of the air for the meteorologist. They and pilots must keep in very close contact in future.

AIRCRAFT IN THE HOUSE.

On March 1st **Mr. Forster** (Sevenoaks, U.), in the course of a speech on the Army estimates, said: —

As far as the Royal Flying Corps is concerned, the supply of *personnel*, both of officers and men, has been maintained, although the provision of skilled mechanics in sufficient quantities has presented difficulties which I think have been overcome. The importance of this cannot be overstated, for while, of course, troops of all kinds contribute their quota to the success of the whole Army, none do more valuable or more conspicuous work than the Royal Flying Corps in all the theatres of war. (Hear, hear).

We all recognise their intrepid daring and indifference to danger, which is only equalled by the skill with which they carry out their perilous duty and the value of their work both to the army in the field and to the safety of our people at home. (Hear, hear).

The training of officers in flying has been very largely extended. It may interest the House to know that we are establishing new flying schools in Canada and in Egypt, and I should like to take this opportunity of acknowledging the valuable services of a large number of Colonial pilots in the Flying Corps. (Hear, hear).

There has been some difficulty and delay in obtaining the necessary aircraft, in spite of the assistance which has been given to us by the Ministry of Munitions, but I hope these difficulties have now been overcome.

The formation of the Air Board with extended powers and the entrusting of the practical business of the supply of aircraft both to the Navy and Army to the Ministry of Munitions will, it is hoped, give the Air Services the priority which their importance demands.

The policy of instituting an Air Board has for some time had the firm support of the Army Council, and, although the new arrangement has been in force only for a week or two, its influence is already having effect. It must be remembered, however, that whatever the efforts of the Air Board and the Ministry of Munitions, they cannot be expected to show at once a greatly increased output.

Anti-aircraft stations have been installed at various points, and, though the actual buildings are only a few huts and officers in each case, there is much work involved in connection with the electrical connections and other accessories which is not always a matter of easy arrangement in isolated country districts. I am not going to boast about what might happen in the event of renewed Zeppelin raids, but we have profited to the full by the experience that we have gained.

[Mr. Forster is to be congratulated on a very moderate and convincing statement of affairs, which contrasts highly favourably with the magniloquence of his predecessors in office. It is pleasing to find a Minister understating rather than overstating the work of his department, and Mr. Forster's future pronouncements on aeronautical affairs will carry the more weight on account of this brief and businesslike reference to the subject.—Ed.]

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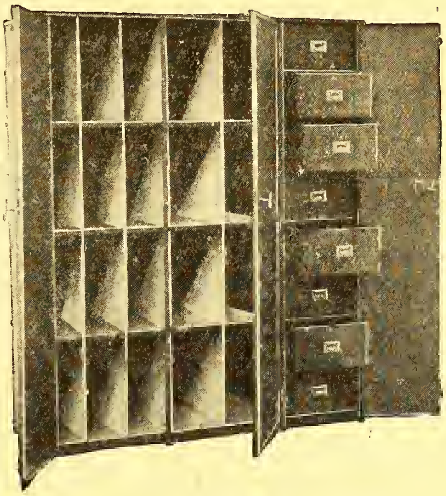

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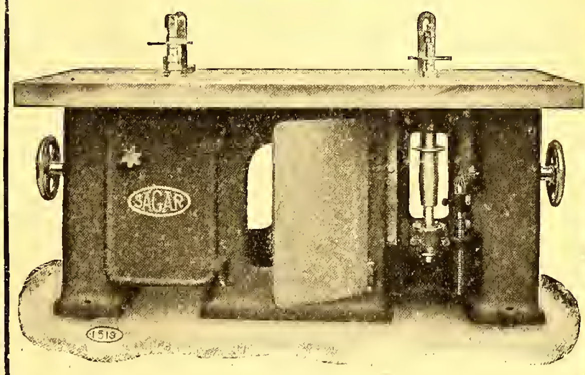

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THE INSTITUTION OF AUTOMOBILE ENGINEERS.

The sixth ordinary general meeting of the session of the Institution of Automobile Engineers will be held in the Hall of the Royal Society of Arts, John Street, Adelphi, W.C., on Wednesday, Mar. 14th, 1917, at 8.0 p.m., when Mr. J. Lawrence Hodgson, B.Sc., A.M.Inst.C.E., will read two papers on "Airscrews."

An invitation is extended to those interested to be present at the meeting, and cards of admission may be obtained on application to the secretary of the Institution of Automobile Engineers, 28, Victoria Street, London, S.W. It will be noted that the meeting fits in between the Aeronautical Society's meetings on Mar. 7th to Mar. 21st.

THE OVER-SEAS AIR FLEET.

In addition to amounts previously subscribed, the sum of £2,250 has been collected in the Malay Peninsula through the agency of Mr. C. Alma-Baker, of Kinta, Perak, for the purchase of an aeroplane for the use of the Royal Flying Corps, which will be named "Malaya No. 30—The Ashworth-Hope."

FORDING.

The thousands of owners of Ford cars will doubtless be pleased to learn that an independent journal, entitled "Fording," is about to be published exclusively devoted to their interests. The publishers are Charles D. Clayton, Ltd., 52, Shaftesbury Avenue, W., and a copy of the first issue will be forwarded, post free, on receipt of 3d. stamps to those interested.

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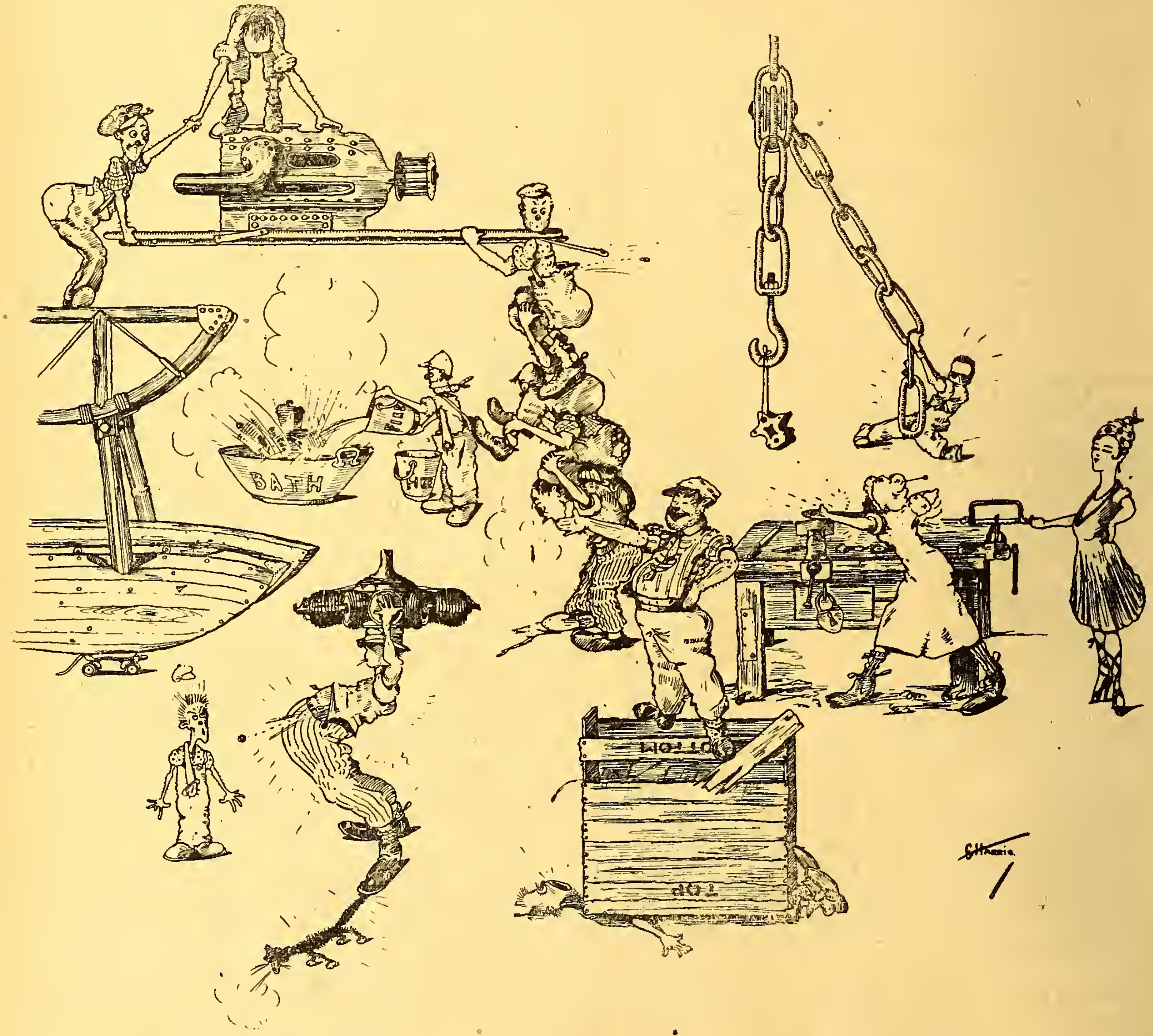

SCENES IN AN AIRCRAFT FACTORY.—VIII.—THE ENGINE FITTING SHOP. In the foreground an aero-engine has been unpacked, in the most approved workshop manner with the case wrong side up. The engine itself is carried away somewhat precariously by a willing worker anxious to display his strength, to the wonder of the shop boy and the discomfort of the shop cat. An assistant unpacker also suffers discomfort, owing to the absorption in his work of the foreman superintending the job. On the right, an amateur and a professional factory girl each works, after her kind. The care necessary to prevent the abstraction of the implements of their trade from the drawer of the bench, indicates a knowledge of shop practice on the part of the artist. Above the bench an energetic worker transports an engine-fitting with appropriate tackle. On the left, a gang of men endeavours to place an engine of novel type in the fuselage of a seaplane, the balance of the gentleman supervising the work being somewhat precarious. The use of a roller-skate to facilitate the moving of the seaplane about the floor indicates originality of thought on the part of the works manager. In the background, an engine, just off test, is enduring a preliminary cleaning.

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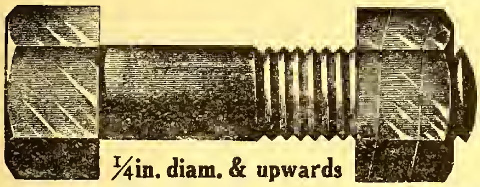

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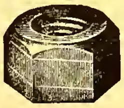

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ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of THE AEROPLANE. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

READERS BY THE HUNDRED.—If you want any information about joining the R.F.C., write to the Director of Military Aeronautics, Adastral House, Blackfriars, E.C.

If you want any information about joining the R.N.A.S., write to the Air Department, The Admiralty, Whitehall, S.W.

Men in the Army, and ratings in the Navy can only obtain commissions in their own branches or transfers to other branches by permission of their immediate commanding officers, who must forward those applications through the proper official channels.

Civilian applicants for commissions in the R.F.C enter through the Cadet Wings, and are trained to fly at the Government's expense.

Applicants for commissions in the R.N.A.S. enter as Probationary Flight Officers, and are trained at Government expense.

If you are blind or partially blind, or have to wear glasses for any serious reason, you cannot become a Naval or Military aviator unless you have some very special qualification.

If you have had special technical training, are over 35 years of age, and attain the necessary social standard, which is not high, you may with luck become a Stores Officer R.N.A.S., or an Equipment Officer R.F.C., even if your sight is defective and you are physically deficient in other respects.

Information concerning appointments as viewers or examiners or inspectors in the Aeronautical Inspections Department may be obtained from the Chief Inspector, A.I.D., Adastral House. Blackfriars, E.C.

Observation of the points indicated above will save a great deal of unnecessary correspondence at the Admiralty, at Adastral House, and at this office. as there is no need to write letters on any point already explained above. The Editor is always pleased to answer questions or explain any points not understood by readers, but space in THE AEROPLANE is valuable, and the same question cannot be answered over and over again week after week. Consequently readers are requested to make quite sure that their questions have not been answered a week or so before.

E. E. H. (Kettering).—THE AEROPLANE has nothing whatever to do with the advertisement published recently offering a £50 prize for an article on "The Future of Aviation," and it is unlikely that the prize article will appear in THE AEROPLANE, unless the advertiser chooses to put it in on an ordinary advertisement page, in which pages, of course, purchasers have the right to publish anything which is not indecent or libellous.

THE AEROPLANE was only started in 1911, so it is impossible to tell you exactly where the gentleman to whom you refer was killed somewhere in the 19th century.

S. H. (Southampton).—Applications for commissions in the R.N.V.R. as Aircraft Inspectors should be made to the Air Department of the Admiralty, whereupon the necessary forms will be sent. Your practical experience of aircraft manufacture should make it easy for you to obtain appointment if there happen to be any vacancies.

R. E. G. (Croydon).—Accidents to aeroplanes do very occasionally occur through the bursting of a tyre whilst the machine is starting or landing. Naturally, many tyres are burst through aeroplane accidents, but it is then a case of effect rather than cause.

As regards inventions connected with aviation there are two courses open to you. One is to make a working model and submit it to the Board of Inventions and Research, at Victory House, Cockspur Street, S.W., and the other is to place the matter in the hands of a reliable patent agent, such as those who advertise in THE AEROPLANE, and get him to proceed with the necessary forms. Still another method is to lodge a provisional patent with the Patent Office, which will cost you a matter of one guinea, and then to sell the idea straight to an Aircraft manufacturer.

O. T. (Highgate).—All questions relating to pay and perquisites of officers in the R.N.A.S. should be addressed to the Air Department of the Admiralty, Whitehall, S.W. A year spent in a motor works should certainly assist an applicant, unless, of course, the selection Board considers that the effects of the Motor Trade would out-weigh the useful knowledge gained there.

F. C. (Mill Hill).—I am afraid I am quite unable to tell you where mementos of that lamentable fiasco—the Aerial Post of 1912—can be obtained. If you really want one of the post cards that was carried the only chance would be to advertise for it, and probably such people as took the trouble to keep these cards would want a sufficiently high price for them.

L. J. P. (Sleaford).—The only way in which you are likely to obtain copies of the R.F.C. handbooks on the Gnome engine and the Renault engine is to ask your C.O. to request the Air Department of the Admiralty to request the Department of Military Aeronautics to supply some copies, unless you happen to know someone personally in the R.F.C. who would do you a friendly turn. As a matter of fact the R.N.A.S now possesses excellent hand books of its own on every aero-engine in use, and Officers Commanding Air Stations can obtain these on application, for loan to ratings.

C. E. T. (Willesden).—The address of the Aeronautical Society of Great Britain is:—11, Adam Street, Adelphi, W.C. The name of the Secretary is Barnard Faraday, Esq.

D. T. D. (Mecklenburgh Square).—Probably it would interest quite a number of the readers of THE AEROPLANE if a portion of the paper were devoted to a weekly article describing and naming the different parts of an aeroplane, with illustrations; such articles to be published afterwards in book form. Also it might interest a certain number of the readers of THE AEROPLANE, or at any rate those juveniles who at present only look at the pictures, if one gave them a series of articles in words of one syllable. Unfortunately, however, owing to the limitations of paper, time, and staff, one has to assume that everybody who reads THE AEROPLANE not only knows the alphabet, but also knows the elements of aviation, so that one cannot please all one's readers.

Captain Barber's book, "The Aeroplane Speaks," price 6s., post free from the Wm. Dawson Publishing Co., 2, Breams Buildings, E.C., gives a glossary of aeronautical technical terms and illustrations covering most of them.

J. R. (Leagrave).—The book by Captain Barnwell and Lieut. W. H. Sayers is entitled "Aeroplane Design," and can be obtained from the Wm. Dawson Publishing Co., 2, Breams Buildings, E.C., for 1s. 9d., post free.

L. S. (Merton Park).—I am afraid you would not find any book on engines sufficiently up-to-date to give you the high technical information concerning aero engines which you require. The majority of books hitherto published are quite elementary or merely descriptive, and do not go into such deep subjects as the angle of cams or the overhauling of 8-cylinder engines. The only thing you can do is to obtain one of the most scientific works published on automobile engineering, and adapt the knowledge obtained therefrom to aero engines. These purely scientific matters are rather outside the scope of this paper, but you might obtain some information as to which is the best possible book on the subject from the Secretary of the Society of Automobile Engineers.

T. W. A. (Chatham).—About the best book yet written on propellers is that by Mr. J. L. Riach, though I don't think he goes into the subject of the actual manufacture and balancing of propellers, but rather into the theoretical design. No book yet published deals with aeroplane floats, and apparently most floats are designed more by the light of nature and personal experience than by science of any kind.

P. H. H. (Boston Spa).—The word "monocoque" really means "single hull," the word "coque" being in French for the hull of a boat. The compound word was originally applied to a type of Deperdussin monoplane in which the body was built up of thin layers of wood and fabric so that it formed a single tubular body, instead of being built of wooden longitudinals and wires covered with fabric. In its present application it has come to mean any fuselage with a round, or oval, section of body in which its shape is obtained by building the fabric out round the longitudinals on upright ribs connected by thin longitudinal strips of wood. This, strictly speaking, is not a monocoque at all.

G. F. E. (Kent).—There are quite a number of aeroplane dopes which do not contain tetrachlorethene, which is the most active poisonous substance which has been used for this purpose. Other dopes contain spirits which theoretically have deleterious effects upon the human frame (to about the same extent as the regular use of spirits of salts and so forth for polishing, or of alcohol as a beverage, if adopted as a hobby), but for practical purposes the effect is nil.

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N. C. S. Y. (Bedford).—As regards the publication of pictures of the Spad—adopt Mr. Asquith's maxim and "Wait and See."

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K. R. P. (Muswell Hill).—A streamline section is given to the bodies of aeroplanes, and to as many other fittings, such as struts and so forth, as is convenient, to enable the air to flow past with as little resistance as possible. The best streamline body for both liquid and gaseous fluids is a section showing a round front and a tapering tail. The bodies of both birds and fishes are very good streamline forms, and have been imitated by man both in ships and aircraft of all kinds. The envelope of an airship is made as good a streamline form as circumstances permit, and it will be noticed on aeroplanes that the struts, and sometimes even the wires, are constructed of something approaching streamline section.

The exhaust from stationary engines on aeroplanes is carried through an exhaust-pipe exactly the same as in a motor car, except that a silencer is not always employed. The exhaust is led, as a rule, over the top plane, but sometimes under the body of the machine.

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W. G. M. (Eastbourne).—Flying has not reached a very advanced stage in South America generally, but a certain amount of work has been done in the Argentine. The Argentine Republic certainly had a few military aeroplanes before the outbreak of war, and have probably augmented that number since. There should certainly be very good prospects in the Argentine after the war, both from the instructor's and manufacturer's point of view.

It is quite impossible to say in so many words the price which new and second-hand aeroplanes will fetch after the war. Some aeroplanes are comparable to Fords and others to Sunbeams, and most of them come somewhere in between.

C. L. (Mottingham).—As an attested badged man you would find but little difficulty in obtaining release to join the R.N.A.S. But should you be de-badged and called up, you will be posted to a regiment, and may find it difficult to obtain a transfer afterwards. If you will refer to the first paragraph at the head of the Answers to Correspondents Column, you will find where to apply for appointment to the R.N.A.S.

A. A. C. (Kensington).—It is rather hard to imagine what class of work of any kind "would suit a young lady who has been used to life indoors." She might, however, be useful in covering planes or stitching fabric for planes. The best thing for her to do is to apply to the Davidson Aeroplane Co., Ltd., Hammersmith Road, or to Waring and Gillow, Ltd., Brook Green Road, Hammersmith. Wages for women in aircraft factories range anywhere between 7s. and £7 a week, according to ability and luck.

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Incidentally, you might give some more attention to spelling, and note that aviation is so spelt, and not "avaition," also that there is an "e" in mathematics. Captain Barber's book, "The Aeroplane Speaks," should certainly not be too advanced for you.

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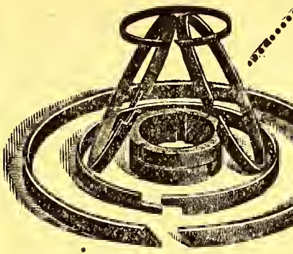

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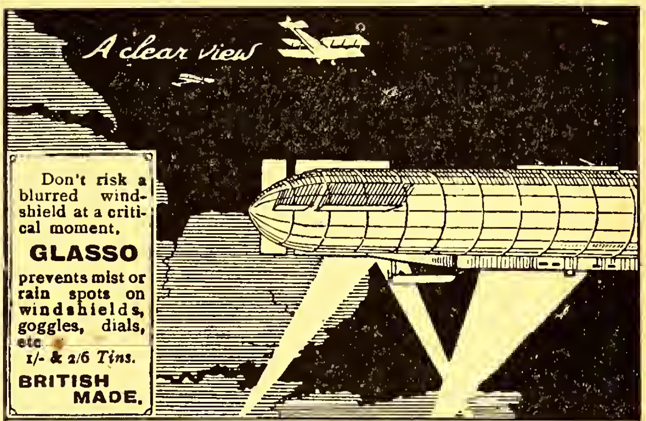

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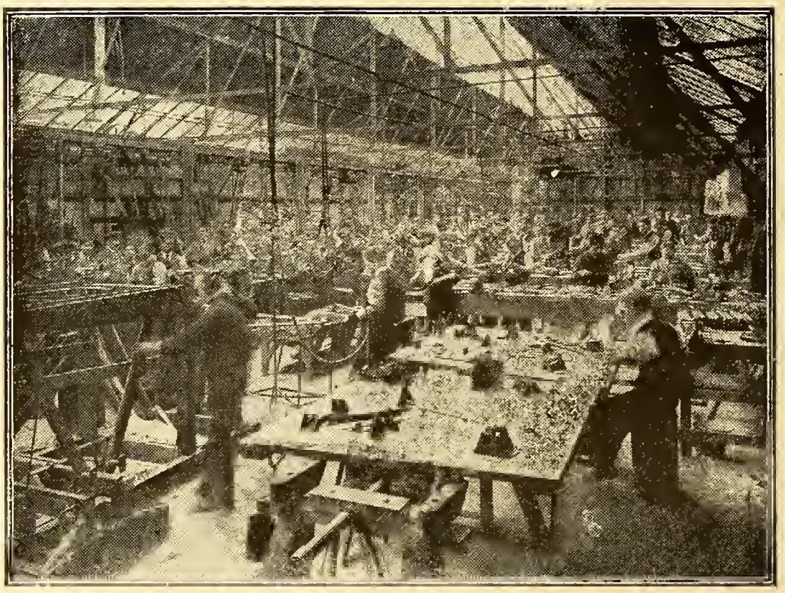

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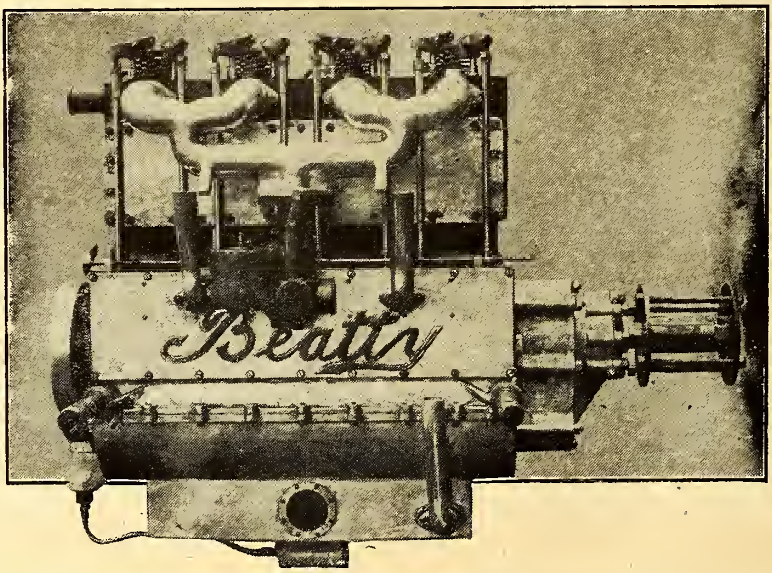

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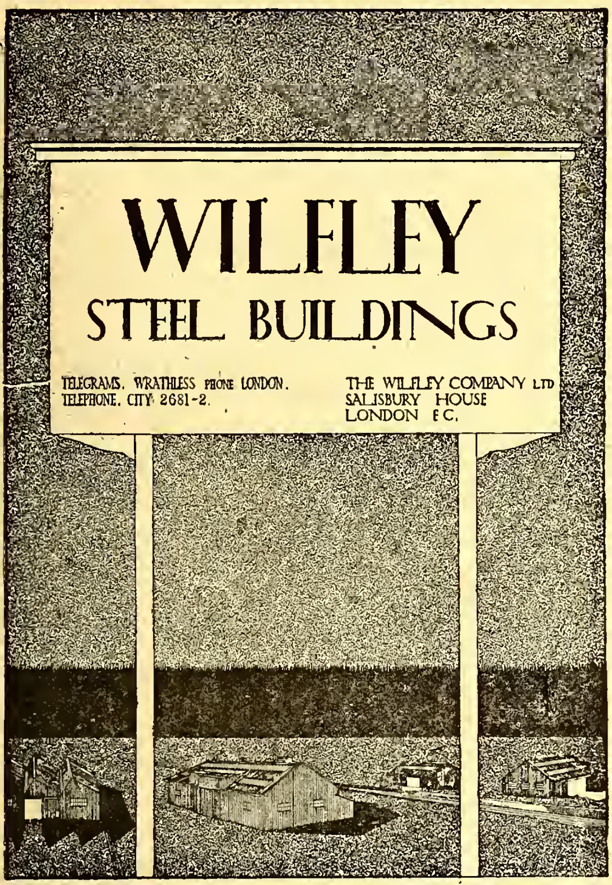
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S.B.A.C.

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THE ROYAL AERO CLUB AND ITS COMMITTEE.

Notice has been sent to the members of the Royal Aero Club that the Annual General Meeting will be held on Tuesday, March, 20th, at 6 p.m., at 3, Clifford Street. The Agenda includes the election of a Vice-President and Council for the ensuing year, and the announcement of the Ballot for the Committee.

By the time these notes appear, ballot-papers for the election of nine candidates to the Committee of the Club will be in the hands of members, and those who have the welfare of British Aeronautics at heart will do well to consider seriously to whom their votes should be given. On the actions of the Committee of the Club after the war will depend very largely the future of aviation in this country, and, as the Committeemen now to be elected will hold office for two years, there is a chance that they may still be in office during that critical period just before and just after the end of the war. Hence the importance of this election.

It would, perhaps, be unfair to say that the Committee has during the past two years been chiefly notable for its masterly inactivity, but one may say truly that it has been slow in acting and has not displayed an amount of action which might have been to the advantage of the Club. It has, if one may say so without being libellous, resembled in many ways the Government of this unfortunate country under Mr. Asquith. It has been too prone to wait and see.

THE CLUB HOUSE DELAY.

Take, for example, the question of the Club House. It was perfectly evident that the few rooms at 166, Piccadilly, were as inadequate for the future requirements of so important a club as was the original British Expeditionary Force for the needs of the Empire. Yet the Committee talked, and considered, and waited, and saw for an unconscionable period. The Club had the opportunity of taking the whole of the building at 166, Piccadilly, a position which would have been wholly excellent, both on account of its convenience and its importance.

There seems no reason to doubt that financial support could have been obtained for the purchase and fitting out of the building, and, if it had been taken over, the Club would have been suitably housed and would have been able to accommodate a large membership. As it turned out, the Committee decided on the present premises, a comfortable enough little house in a back street, but obviously too small even for the present membership. One is there deprived of that privacy of conversation which was obtainable in the more distant portions of the one big room of the old premises, and the whole building is cramped and confined in comparison with the lay-out of other clubs of even less importance.

Be it said that the present house is very prettily fitted out, and reflects great credit on the Secretary, Mr. Stevenson, who has done remarkably well under difficult circumstances, but the place is not what is needed by the Royal Aero Club of Great Britain to-day, and still less is it what will be needed in future if the Club is to be what it ought to be.

LOSS OF POSSIBLE MEMBERS.

It seems more than probable that, if the Committee had acted energetically and in good time, there would have been no need for the formation of the Royal Flying Corps Club, which cannot fail to draw away many members from the Royal Aero Club, but there was no suitable accommodation for officers home from the war areas at the old premises, nor is there at the new, for that matter.

Moreover, it seems quite possible that the R.F.C. Club was founded partly because some of those in authority in the Corps misliked the behaviour, manners, and customs of some members of the Royal Aero Club. Certainly there were times when one would have hesitated to bring any senior officer, or, indeed, any gentleman of mature mind and ideas, into the Royal Aero Club as a visitor, and, though of late the demeanour of the younger members has markedly improved, one cannot absolve the Committee from responsibility for the happenings of the past. In fact, one of the chief counts against the Committee, as constituted during the past five or six years, has been that with very few exceptions the Committeemen have been utterly out of touch with the members of the Club, and to a great extent out of touch with practical aviation.

THE OFFICIAL ORGAN QUESTION.

One may, perhaps, draw attention, also, to the Committee remissness in not following the recommendations of the members. At the last General Meeting, many months ago, it was resolved that there was no further need for the Club to expend some hundreds of pounds per annum in paying for the free circulation of an official organ, yet, so far as one can gather, no definite action has been taken on this point.

Naturally one writes as an interested party on such a question, and so one's opinions should be discounted, but probably most people will agree that the Committee is not behaving equitably in spending the Club's money in supporting one publication more than another. Technical papers should exist on their merits, and not by adventitious aid, as one feels sure all contemporary papers will agree. This paper, in common with its contemporaries, is willing to publish the Club's official notices free of all charge, so that there is no need for the Club to have an official organ at all. And any member of the Club who was not sufficiently interested to buy an aviation paper for himself, without having it delivered to him by the Club, would hardly be likely to be sufficiently interested to read the Club's notices, even if he takes the trouble to open any paper which arrives without his asking for it.

One would have no argument on the grounds of equity if the Club owned and published an official organ itself, but one submits that the Committee has no right to subsidise any one proprietary paper, no matter whether it be this paper or any other. As for being the proprietor of its own official organ, one recalls the Royal Automobile Club's efforts in this direction, which were not such as to encourage the Royal Aero Club to go and do likewise.

Wanted, a New Committee.

Evidently there is a strong feeling among the members that a new Committee is wanted, for, though there are only nine vacancies, twenty-one members have been nominated as candidates. In alphabetical order these candidates are :—

Brigadier-General W. S. Brancker, R.F.A.
Mr. Griffith Brewer.*
Mr. Ernest C. Bucknall.*
Capt. R. L. Charteris, R.F.C.
Mr. Louis Coatalen.
Commander Sir Arthur Trevor Dawson, R.N.
Flight Commander John Dunville, R.N.*
Wing Commander Spenser D. A. Grey, R.N., D.S.O.
Colonel Sir Capel Holden, R.E., K.C.B., F.R.S.*
Professor A. K. Huntingdon.*
Wing Commander A. M. Longmore, R.N.
Squadron Commander F. K. McClean, R.N.*
Colonel E. M. Maitland (Wing Captain R.N.A.S.).
Lieut. N. C. Neil, R.N.V.R.
The Lord Northcliffe.
Wing Commander Alec Ogilvie, R.N.*
Lieut.-Colonel Mervyn O'Gorman, C.B.*
Lieut.-Colonel P. H. L. Playfair, R.F.C.
Flight Commander C. F. Pollock, R.N.*
Mr. J. Herbert Spottiswoode.
Mr. G. Holt Thomas.

Those marked with an asterisk are the members of the old Committee who retire automatically and offer themselves for re-election.

An Embarras de Richesse.

Where so many excellent gentlemen offer themselves for re-election, it is a difficult matter to choose between them. It is therefore safest to regard each candidate not so much for his high personal qualities as for what he is likely to be able to do for the welfare of the Club in the critical period to come.

On general principles one might begin by eliminating all the nine retiring members, if only for the sake of having as much new blood as possible in the Committee for the future. There are, however, two of these nine who should be retained at all costs.

The first is Squadron Commander McClean, to whom, more than any other one man, the Club owes its existence and its most successful activities. It was he who made possible the Club's aerodrome at Eastchurch, and it was he who made it possible for the Club to train the first four pilots for the Admiralty.

The second is Wing Commander Alec Ogilvie, one of our pioneer experimenters, whose technical knowledge should on no account be lost to the Committee. Though at present in the R.N.A.S., it seems probable that both these officers will return to civilian life after the war, and will then be of still greater value to the Club.

For the other seven retiring members one may say that they have served the Club well in the past, and deserve to be elected to the Council. For several of them one has a warm personal regard, and to them one would merely plead that after many years of useful work they can afford to give new men a chance of furthering the Club's fortunes. Of others one can say that the Club will be the better and freer for their absence from the Committee.

The Difficult Seven.

The real difficulty is to choose seven out of the remaining twelve, so as to make the Committee really representative of the membership, which, it must be remembered, includes civilians as well as the Services.

Beginning at the top of the list, General Brancker, of course, must be elected, for not only does he represent the recognition of the Club by the Royal Flying Corps, but he has proved himself to be a man of foresight, a clear thinker, and a notable organiser, whose intellect is likely to be of high value to the Club, apart from any Service matters.

It may be well here to point out that members *must* vote for the particular men they wish to put on the Committee, and that they must avoid the trap of assuming that everyone else will vote for the most obviously desirable candidate, so that their vote does not matter.

Next one must advocate Mr. Louis Coatalen's candidature. Apart from being one of the cleverest engine-designers in this country, Mr. Coatalen has shown business ability of the highest order, great courage in his ideas as to the future needs of aviation, and inexhaustible energy in carrying out his plans. Such a man is of precisely the type required to energise the Committee.

The following name on the list is that of Sir Trevor Dawson, a director of Vickers, Ltd. A man of high position, controlling vast interests, and capable of bringing strong influence to bear in high places, Sir Trevor Dawson is eminently suited to assist in raising the Royal Aero Club to that place in the scheme of things to which its resonant title and ostensible mission in life indicate it as belonging.

The next name which appears indispensable is that of Colonel E. M. Maitland, one of our leading specialists in airships, and one of the two introducers of the kite-balloon to His Majesty's Armed Forces. Representing, as he does, the lighter-than-air branch of the Services, Colonel Maitland would be entitled to a seat on the Committee on that count alone. Apart from that, his personal qualities of physical bravery, moral courage, tact, and amiability of an unusual kind which wins at once regard and respect, make him particularly desirable as a member of the Committee.

The seventh indispensable for the nine vacancies is certainly Mr. Holt Thomas. As an organiser, as a judge of men, and as a diplomatist, Mr. Holt Thomas can have few equals. As a personage of international importance where aeronautical affairs are concerned, his influence with foreign nations after the war will be of the greatest value, not to the Club merely, but to British Aeronautics in general.

Trade Interest.

In thus strongly advocating the election of three representatives of the Aircraft Industry one does so with full knowledge of the history of the Motor Trade and the development, or non-development, of motoring. One merely remarks that the men who had the foresight and imagination to back the future of aircraft during those evil days before the war are not of the same mental calibre as those who failed to make the motoring history of England what it might have been. There is little fear of Trade Interest having any deleterious effect on the Royal Aero Club, especially when one remembers how the products of the best brains in the Aircraft Industry have saved the situation on active service again and again, and have proved the ability of the Industry to see farther ahead into the needs of even such a highly technical branch of warfare as flying than any but a few of the technical officers of the Services.

The Last Two.

As to the last two names to be elected. One would like to see Lord Northcliffe's name on the Committee, but it is necessary for the good of the Club, and of British Aeronautics, that Committeemen shall attend meetings regularly, and, if Lord Northcliffe gave to the Club as much time as would justify his election, one would be gravely concerned as to the effect on the government of the British Empire and on the conduct of the war which would be entailed by such diversion.

Wing Commander Longmore and Wing Commander Spenser Grey would make excellent members of the Committee, if they can be sure of attending meetings frequently. Both have more than their fair share of brains, and their mental activity is kept in hand by a strong element of common sense. Both have long experience of flying, dating from 1911. Both have seen a great deal of active service. Both are officers of the real Navy, which is not strongly represented on the Committee at present. Therefore one feels inclined to advocate them as the best choice for the two remaining places.

Of the remaining four names, Lieut.-Col. Playfair, Capt. Charteris, Lieut. Neil, and Mr. Spottiswoode, one can honestly say that any of them would be an excellent choice. All have long been concerned with flying, all are sportsmen of the best type, and, if they are not all elected to the Committee, it will only be because other candidates have, for one reason or another, still higher claims. There may also be opportunities ere long of co-opting them to the Committee to fill vacancies which may be caused by the resignation of certain of the nine other members of the Committee belonging to the half who were elected last year.

A Grave Responsibility.

It is earnestly to be hoped that every member of the Club will make a point of recording his vote in this election. Reform in the Club is urgently needed. The whole future of the Club, and to a very great extent the future of aeronautics in this country, depends on the energy and foresight of the Committee during the next two years. Omission to vote, or lateness in sending in a ballot-paper, or voting for a friend because he is a friend and not because he is the best man, may have far-reaching results. Let the members of the Club realise their responsibilities and vote accordingly.—C. G. G.

THE DEATH OF COUNT VON ZEPPELIN.

It has been announced that Cavalry-General Ferdinand Count von Zeppelin died on the morning of March 8th, at Charlottenburg. The immediate cause of his death was congestion of the lungs.

Those who respect the truly patriotic doctrine, "My country, right or wrong," will recognise in Count von Zeppelin a great patriot, albeit an enemy. Setting aside the fact that he was an enemy, and a potent enemy, of this country, he stands forth as one of the dominating figures in the history of aerial navigation, and it is as such that he deserves primarily to be considered.

Ferdinand von Zeppelin was born at Constance on July 8th, 1838, so that he was in his seventy-ninth year when he died. He was educated at the Polytechnic at Stuttgart, and at the Military School of Ludwigsburg. Later he studied at the University of Tübingen.

In 1858 he was appointed to a cavalry regiment, and served in the wars of 1866 and 1870. It is said that he also served with the Federal or Northern Army while on a visit to America during the Civil War, and then first appreciated the possibilities of aerial observation through ascending in a captive balloon.

It is also said that it was he who fired the first shot in the Franco-German War of 1870. Be that as it may, it is certain that he won high distinction as commander of a cavalry reconnaissance which produced far-reaching results at the beginning of the war.

After that war he commanded a brigade at Ulm in 1887, and was agent-plenipotentiary for Würtemburg in the Federal Council at Berlin. In 1890 he commanded a brigade at Saarburg, and he was promoted to the rank of general on retirement in 1891. Thenceforward he devoted himself to the development of aeronautics.

The First Airships.

It seems probable that Count von Zeppelin was first attracted to the study of airships by the experiments of Capitaines Renard and Krebs in France in 1884, and it is said that thereafter he studied the airship problem closely with a view to personal experiments. In any case, he began his own work seriously in 1898. Being possessed of a comfortable patrimony, he was able to work for some years at his own expense.

His first airship took the air on July 1st, 1900, but made ascensional tests only, and was safely returned to her floating shed on Lake Constance, with only minor damage to framework and fittings. This damage was repaired, and certain alterations were made, and the ship made her next appearance on October 21st of the same year, when her power-plant of two Daimler automobile engines, of 16 nominal h.p. each, gave her a speed of about 18 miles an hour.

Much was learned from these brief trips, but Count von Zeppelin had spent all his money and the proceeds of the sale of his estates. He was on the verge of giving up his attempts in despair, when he obtained a grant of some £20,000 from a wealthy syndicate which enabled him to carry on. He also obtained the recognition and approval of the Kaiser and the King of Würtemburg.

The next five years were devoted to building a real airship, with 170 h.p., which appeared on November 30th, 1905. The wind was too strong for the handling party, and the tow-ropes fouled the ship, which descended on the water with some slight damage. The next appearance was on January 17th, 1906, when the ship rose suddenly to 1,500 feet, and was somewhat seriously deteriorated in landing afterwards.

Rebuilding occupied the rest of the year, and the result, which was practically a new ship, known as Zeppelin III, came out in December, 1906. She made a highly successful trip of fifty miles, returning undamaged to her shed.

On July 1st, 1907, the Zeppelin airship firmly established her potential capacity by making a twelve-hour trip covering some 200 miles.

Further alterations, experiments, and rebuilding occupied the next eighteen months, when triumph and disaster came together, a trip of 400 miles terminating on August 6th, 1908, with the complete destruction of the ship by burning, after making a safe landing.

The Turn of the Tide.

By this time Count von Zeppelin's pluck and determination and the achievements of his ships had won for him the sympathy and respect of all concerned with aeronautics. He had many admirers and some friends even in France and England. In Germany the disaster made him at once a hero and a martyr. Subscriptions were opened all over the country, and the sum of £275,000 was collected. The Herr Doktor von Bethmann-Hollweg, then Secretary of State for the Interior, sanctioned the payment of £25,000 from the State, as "compensation for many years of self-sacrificing creative work in the building of navigable airships."

Thenceforward the career of the Zeppelin firm has been fairly plain sailing. Accidents occurred which shook the faith of the faint-hearted, but they were unavoidable in such new sciences as aerial navigation and airship construction, for the various disasters were due to ignorance on both subjects. For instance, L. I was wrecked in the North Sea in a squall, which better knowledge of navigation would have avoided, and L. II was burned at Johannisthal, owing to structural errors.

The career of the later ships and their method of operation are too well known to call for recapitulation here, but it is well to remember that in all essentials they are the same as Count von Zeppelin's earliest efforts. It has been said that the design of the Zeppelin is based on the plans of an engineer named Kober, who was at the Zeppelin works in 1899, and that his plans were copied from an unsuccessful ship built by an Austrian, David Schwartz, in 1897.

A Great Patriot.

Be that as it may, Count von Zeppelin, at the age of 51, after a long and distinguished military career, when most men would have retired to a life of ease, staked his entire fortune, and thereafter frequently risked his own life, in a whole-hearted endeavour to provide his King and Country with a weapon of war such as no other country possessed.

In that he succeeded in so doing he deserves his place among the great inventors of the world, and it is due to his memory to emphasise the fact that, unlike the majority of inventors of war matériel, he refused to sell any of his products, or the designs therefor, to foreign countries, despite tempting offers.

There are without doubt many men as patriotic in all other countries, but it would be difficult to mention any one who has combined in the same degree self-sacrifice, undefeatable determination, and ultimate success. One cannot even except our own and the French pioneers of aviation, who will, one feels sure, give precedence to Count von Zeppelin, in that they have all had youth on their side to buoy up their hopes and to assure to them a certain livelihood in the event of ultimate failure.

For these reasons Count Zeppelin must be acknowledged as a great man, and as an enemy worthy of respect.

The Zeppelin as a Weapon of War.

Considered as a weapon of war, the Zeppelin airship has its limitations, but none the less Germany has scored heavily by having the monopoly of its use.

Its possibilities were demonstrated long before the war, and those responsible for the defence of this country are gravely to blame for neglecting such warnings. It is now well established that a Zeppelin airship, probably the "Hansa," voyaged over this country in 1912. Acting on inside information, the present writer gave every possible publicity to the fact at the time, and, though the full particulars of the voyage must have been known to the High Authorities, he was ridiculed in the officially inspired Press for evolving "scare-ships," just as he and others have since been attacked for allegations as to more recent deficiencies in our aerial forces—which have subsequently been proved true.

The Navy's View.

The Navy admits freely the usefulness of Zeppelins as sea scouts, both in co-operation with submarines and before and during fleet actions. It has been made known that an airship acted as a scout for the submarines which sank the "Cressy," "Aboukir," and "Hogue." It is stated on good authority that Zeppelins warned the German Fleet of the approach of Admiral Jellicoe's battle fleet in the Jutland affair, and later enabled German destroyers to rescue the crews of certain maimed German battleships, which were then sunk by the Germans themselves, when without such air scouts those ships would have been cut off and captured by our fleet.

Military Importance.

Zeppelin invasions of England and Scotland have, it is true, been beneficial to us to the extent that they have brought home to the populace the reality of war and have encouraged recruiting. Against this it would be foolish to deny that they have restricted, or at any rate have affected deleteriously, the output of munitions of war.

Munitions not produced in a given time are the same thing in war as munitions produced and destroyed. So much man-power, so many man-hours are wasted, and supplies are diminished by that amount. One cannot shut down night-shifts in factories, hamper transport and material and workers, and otherwise delay production by cutting off light, without doing harm to munition supplies. To that extent, whatever it may be, harm has been done, and it would be perverting the truth to say that airships have been of no military consequence.

A Warning.

The fact that during the latter part of 1916 all airship raids have met with heavy losses is a satisfactory feature of the development of our aerial defences, on which those to-day controlling the Flying Services deserve every congratulation. It is, moreover, a justification of Mr. Churchill's promised "swarm of hornets."

But it would be unwise to assume that the losses already suffered will prevent any raids in future. The long period which has elapsed since the last raid has given the enemy time to build many new ships, and to rebuild, refit, or repair still more old ones. Therefore it is more likely that the next raid, even if it be an expiring effort, will be on a much greater scale than anything seen hitherto.

The death of Count von Zeppelin would, to an essentially sentimental people such as the Germans, lend a particular appositeness to such a raid, and the loss of 25 per cent. of the attacking force—say 10 ships out of 40—might well be regarded by the Germans as reasonable in comparison with the losses of troops in the field in this or any other war.

Future Possibilities.

Therefore it will be well to pay little attention to those who scoff at the Zeppelin as a pricked bubble, and to recognise that the modern airship is still a weapon of military importance which must be treated with due respect, and against which retaliatory action over land and sea must be taken in all seriousness.

The best airship is always, and must always be, inferior in speed and climbing power to the best aeroplane, but each class of aircraft has its limitations. By recognition of this fact the true value of the airship may be gauged, and the aeroplane as a weapon of defence may be prepared adequately to meet it.—C. G. G.

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TRAINING.—VIII.

BY "BERKELEY."

No reference was made in the previous article to the most common battle manœuvre of Napoleonic practice—the outflanking of one's enemy. In the sixteenth, seventeenth, and eighteenth centuries the most direct system of fighting held popularity, and the frontal attack, elaborated possibly by interwoven ceremonial and the glow of chivalry, dominated the tactics of the era. In hand-to-hand fighting, modified but little by close range fire effect, there was little to be gained by a flanking movement, unless that movement held sufficient of success to permit of the severing of the enemy lines of communications, or an effective isolation of one section of an army from another section whose support was to the enemy an essential of success.

In those times the military science tended by degrees to become pedantic, and war proceeded on lines of arbitrary seemliness, from which none but leaders of the highest genius were able to depart. The inchoate systems of mediæval warfare had of necessity to be abandoned, and a science based on true principles brought into being.

But with order came rigidity, and with rigidity genius was unable to dwell. In consequence the erratic movements of Peterborough's tiny army in Spain achieved success out of all proportion to the training or size of his force, owing to the brilliant unexpectedness of his method. It brought victory while it inexpressibly shocked the vanquished.

To them, representatives of the chivalry of Spain, it seemed as though an impetuous duellist had killed his opponent whilst the latter bowed in preliminary courtesy. So, too, in a lesser degree, with Prince Eugene and His Grace of Marlborough, before whose allied armies the proudest troops of France had perforce to yield the place of pride.

The Extinction of Pedantry.

But the education of the nations is slow in its progression, and pedantry held its sway for nigh upon two generations longer, until first de Broglie in Lower Germany, and later Frederick the Great, demonstrated the existence in war of affairs beyond the scope of the drill-book and the turgid treatises of the learned.

Swiftness of movement, rapid development of fire effect, geometric precision in concentration, and flexibility of line took the place of the over-elaborated ceremonial of war, in which it was almost indecent for a fortress to fall until it had been invested completely and with due solemnity. An army acted out of its turn with little consideration for the feelings of the enemy, and accepted the palms of victory with no shame.

The Renaissance of Science.

Thus came the first glimmering of the Renaissance of Scientific War. The decline of the Monarchy in France coincided with the rise of military genius in the army schools, and the principles expounded by Guibert, a Royalist officer, found a fertile ground in Napoleon Bonaparte, Cadet of Artillery at Brienne. He brought to his chosen profession true genius and the nucleus of acquired knowledge.

Pedantry died in the wars of Napoleon—or perhaps became comatose for a space, and brilliance brought freshness to the earth. Rapidity of action and decision of purpose dominated his system of war. In strategy he ignored the laborious securities of old days, and gambled for high stakes—knowing clearly the reverse of the coin. His startled enemies, unaware of the value of concentration, and lacking any clear and at the same time *simple* plan of campaign, were defeated in detail, where in a body they would have been invincible.

Division is Weakness.

In tactics, as in strategy, Napoleon directed his efforts at the division of his enemy, and, if that was not possible, he concentrated his main attack on one flank, trusting to success at that point for victory at all. The successful demonstration of his principles on many fields of battle brought about their adoption in part—the more obvious part, for all manœuvre is valueless if the directing spirit is lacking—by the armies of Europe, and war became an orgy of flank attacks, when encounter battles were possible at all. On occasion, opposing armies almost completed a circuit of the field of battle, owing to the respective outflanking movements not coinciding.

Mobile Tactics and Limitless Flanks.

In the South African War, which proves nothing, owing to its unwarlike principles, outflanking an outpost was largely discounted by the high degree of mobility possessed by the Boers and the extreme flexibility of their front.

To-day it has almost disappeared. The great length of the respective fronts, the increased mobility, the more intense fire effect, and the use of aircraft have all contributed to the restoration of the frontal attack to its due place in the propriety of war. The increased importance of artillery has paradoxically brought about a revival of the hand-to-hand fighting which gave interest to existence in the knightly days when England was young.

The intensive employment of artillery must lengthen greatly the period of fighting before a decision is obtained. Consequently into the hands of infantry has again come the resolution of the battle.

Strategic Flanks.

To-day the outflanking of an opponent belongs rather to strategy than to tactics. In the opening days of the present war the Allied troops retired in order to avoid division by the enemy and defeat in detail, and in turn von Kluck retired because his flank was, or he imagined it was, in danger of being turned by the French reserve troops massed to the south of Paris.

But the areas and the duration of time involved made the manœuvres in question part of general strategy rather than of battle tactics. And so when the war again opens from the parallels, flank attacks will be on the larger rather than the lesser scale. And the aeroplane will add difficulty to their practice. If dispositions are always considered geometrically, and time and distance are always under consideration, the old element of strategic surprise will, when revealed by aircraft, be countered readily and with certainty.

Parallel Warfare.

The conditions of a battle in parallel warfare (that at present a matter of common practice in Flanders) differ greatly from those of an encounter battle in the open, and resemble more closely the siege operations of old. The preparations are more deliberate, and the relative advantages of the two forces engaged differ from those common in the battles of open warfare.

One army almost automatically assumes the defensive when the bellicose intentions of the opponent become definite. Aircraft have a more elaborate part, if not necessarily more active, and cavalry, the allied arm to

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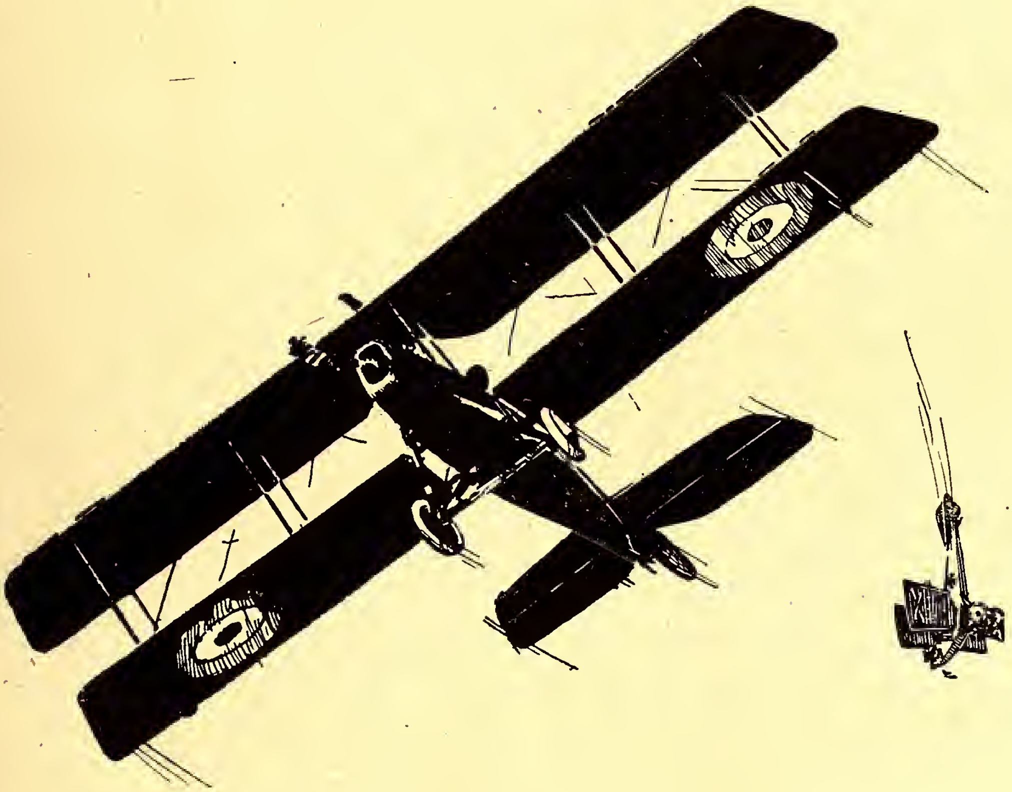
A BRITISH PILOT AND A—



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aircraft, ceases to be of use either before, during, or after the action. The enemy dispositions are more clearly known to the attacking force because there is more time available for reconnaissance and for the elucidation of the results gained thereby.

Photographic War.

In the weeks before the battle the aeroplanes are diligently occupied in photographing the areas occupied by the enemy to a depth of many miles. (This process of aerial photography is a matter of daily routine which is hastened but little by the imminence of a battle.) The growth of each new emplacement, the appearance and slow lengthening of each new trench, the increasing density of the wire entanglements, are all recorded daily that a later protective covering cannot destroy the memory. Day by day the knowledge of how accurately to read the meanings of the photograph increases, and the store of information at the disposal of the General Staff is thereby augmented.

The artillery in preparation for the day of action is registered onto every available target by the ubiquitous aeroplane, and the professional joy of the gunner grows with his increased knowledge of the enemy to whom at the appointed hour he proposes to distribute death.

The Reason for Redoubts.

The principle of attacking strength rather than weakness has its closest application in the case of an attack from an entrenched position on an entrenched position. The powerful and well-placed trench fortresses—colossal redoubts—placed at intervals along the enemy lines in accordance with the strategic importance of the conformation of the ground, must first be taken before a general advance can be made.

They can rarely be isolated, owing to the intensity of enfilade fire they can direct at the troops passing them. Unless the guns have prevailed and hammered these redoubts into a battered mass of ground "unfit for human habitation," the infantry must of necessity direct their attention to these fortresses. Failure at these points may restrict the breadth of the advance, and, in consequence, turn the expected victory into a disaster of the greatest magnitude, which, because two lines of trenches have been delivered up over a small sector by the enemy, might be described in the papers at home as a "Complete Victory." The casualty list and the later disastrous retirement may be ignored. Success in trench warfare can only be attained by an advance over a broad part, in order that the salient created will be too great to be endangered by enfilade fire by the enemy, and will admit of such support as may by its very existence bring about an enemy retirement on either side.

Dangers of Isolation.

The conditions of trench warfare make cohesion difficult to maintain. The subterranean habits of the modern soldier and the persistent dislocation of the terrain by the constant rain of H.E. projectiles tends to localise all sections of the advance. Hence it is quite possible in the height of the conflict for a battalion or a higher unit, such as a brigade, and in exceptional cases a division, to advance far into the mysteries of enemy territory, unsupported on either flank.

Under these conditions there is often no consolation to be gained from the position of the enemy, who, despite the preliminary bombardment, may be in continuous telephonic communication with their divisional headquarters, and are consequently possessed of fairly accurate information as to their opponents' movements. Hence they will be able to take advantage of the isolation in which their opponents have, probably unknowingly, placed themselves. Instances of this condition in battles on the French front will occur readily to the reader. The Signal Service, excellent though it is, cannot keep pace with an advance throughout the extent of the front engaged.

The infinite number of trenches radiating in every direction, and designed with great skill to give the most effective field of fire over every possible line of advance, adds by the concealment available great difficulties in the way of adequately estimating the points most strongly held by the enemy until actual contact has unleashed the concealed thunders.

Contact Aeroplanes.

From the air some assistance can be given, but only by the accepting of very high risks by the aeroplanes engaged, risks which can only be justified when the supply of aircraft and of flying personnel is adequate. The opportunities of concealment from detection by aviators, available to troops in the trenches, will in course of time be made of more and more use, until, as always in the art of war, the rapid development of one feature is countered promptly by another.

But the great lesson to be learnt by those about to enter into the practice of war is that, above all things, cohesion must be maintained. A time-table arranged with skilful elasticity, possible by reason of perfect preliminary intercommunication, should be adhered to as rigidly as the exigencies of battle will admit. Unexpected obstacles at one part of the line, such as the failure of the artillery to eliminate a position of great strength, should be overcome before the entire line advances, unless a forward successful movement on either flank can be made on broad enough areas to isolate the so far invincible redoubt, and to eliminate the risks of enfilade fire. On occasions, as at Loos, an advance has been made beyond strongly held points of the enemy line, with disastrous results to the troops engaged. Cohesion was lacking in that action, and the history books were robbed of another victory.

Only by a complete co-ordination of all effort by all arms and all parts of all arms can victory come to an army.

AIRCRAFT IN THE HOUSE.

On March 12th **Major Baird**, Parliamentary Secretary to the Air Board, replying to Mr. Pemberton-Billing, said that the responsibility for the design of aeroplanes for the use of the Royal Naval Air Service and the Royal Flying Corps, which was formerly vested in the Director of Air Services and the Director-General of Military Aeronautics respectively, is now vested in the Air Board for both Services. The requirements of the Royal Naval Air Service and the Royal Flying Corps are not necessarily the same.

A SOCIAL FUNCTION.

Those who wish a few hours of pleasing relaxation from the strain of war work will do well to note that the Royal Aero Club, the Aeronautical Society of Great Britain, and the Society of British Aircraft Constructors will be "at home" at Lady Drogheda's Aircraft Exhibition at the Grosvenor Galleries, 51a, New Bond Street, W., at 8.30 p.m., on Thursday, March 15th, when short addresses on the "Air" will be given by Brigadier-General Brancker, R.A., Lieut.-Col. M. O'Gorman, C.B., and others. The proceedings will be opened with an address by Lord Sydenham.

Cinematograph films of officers of the Royal Naval Air Service and Royal Flying Corps making parachute descents will be shown.

Tickets of admission for members of any of the three organisations cost 2s. 6d. each, and tickets for guests cost 5s. All receipts will go to the funds of the Flying Services. Tickets can be obtained from The Aeronautical Society, The Royal Aero Club, and The Society of British Aircraft Constructors. Members of those societies who have not already obtained tickets will be admitted on signing their names at the Grosvenor Galleries and paying for their tickets there.

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AIRCRAFT IN THE HOUSE.

On March 7th, **Major Baird** (Rugby, U.), replying to Mr. Billing (Herts, E., Ind.), said it had never been the practice to burn aeroplanes immediately after acceptance when they had become obsolete, although it would be desirable on other grounds to dispose of them in that manner. It might, however, become necessary, owing to shortage of storage accommodation, to take this course before long in respect of certain machines, including some known colloquially as the P.B. Scout. (Laughter.)

All contracts for machines which might become obsolete or have turned out to be unsuitable for active service, or for instructional purposes, were cancelled as soon as this could be done without injustice to the manufacturers.

Mr. Macpherson, replying to Sir H. Dalziel (Kirkcaldy Burghs, L.), who asked whether the Government accepted the accuracy of the statement in the German wireless that 18 of our aeroplanes were brought down in one day on the Western front, said:—The Government does not accept the accuracy of this or any statement in the German wireless communiqués, nor, as a matter of general policy, are corrections made of misstatements in these communiqués, since obviously this would encourage the enemy to make false statements in order to elicit the truth. In the case in question the German wireless stated that the enemy lost 18 aeroplanes on March 4th, referring apparently to the whole Western front, and not merely to the British front.

Sir H. Dalziel asked whether the hon. member could assure the House that we still maintained the mastery of the air on the Western front.

Mr. Macpherson.—I think I can give that assurance. (Cries of 'Oh! Oh!')

[It would be well for some responsible Minister to state clearly what is to be understood by "supremacy in the air," "dominance in the air," "mastery of the air," and bare "superiority in the air." They are all very different things. At present we may still hold the superiority in some respects, but we do not appear to hold supremacy, or even mastery as we did just before the Somme attacks began.—Ed.]

SCENES IN AN AIRCRAFT FACTORY.—IX.—THE DOPE SHOP.—At the top the whirling ventilator fan indicates the violent changes of air believed to be necessary to counteract the spirit fumes from the dope. The aforesaid violence is further indicated by the fate of the overall of the dope-lady, who has ventured too near the air-inlet. Another fate, that of a careless workman, is shown by the presence of the ambulance-men. In front of them, thoroughly respiratored, two careful workmen carry a cauldron of dope, from which issues the familiar pear-drop smell of amyl-acetate. In the centre, a fuselage is being thoroughly doped by a gentleman whose musical whistling indicates his contempt for dope-poisoning. Another, and somewhat gymnastic, worker operates on the bottom of the fuselage. A properly scientific inspector examines the quality of the dope, regardless of impending doom. On the near side of the fuselage a new worker has just perceived, with a shock, the ominous expression on the front of the machine, produced by the propeller boss, the inspection plate, and the exhaust-pipe. In the left foreground another unguarded worker is overcome by the pear-drop odour. On the right, an irate dope-hand expresses his opinion of an inefficient assistant, regardless of consequences to another worker, and to the admiration of a third, who, judging by his gas-mask, appears to be a retired soldier, and has probably never heard anything like it among the Army in Flanders. Or, perhaps, he may be merely assuring his assistants that dope is not really poisonous, and that high temperatures and forced draughts are quite as bad as the dope itself.

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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," March 6th, 1917.

Admiralty, Feb. 24th.

R.M.L.I.—The following officers to be secd. whilst holding special appts. :—Capt. (temp. Lt.-Col.) R. Gordon, D.S.O., Capt. (temp. Maj.) A. C. Barnby, Capt. Percival Owen, Capt. (temp. Lt.-Col.) E. L. Gerrard, D.S.O., Capt. (temp. Lt.-Col.) C. E. Risk, Capt. (temp. Maj.) H. Fawcett, Capt. (temp. Maj.) C. F. Kilner, D.S.O., Capt. (temp. Lt.-Col.) C. E. H. Rathborne, Capt. (temp. Lt.-Col.) I. T. Courtney, Lt. (temp. Capt.) A. P. Dawson to be Capt., vice Risk, secd. Lt. (temp. Capt.) V. C. M. Kelsey to be Capt., vice Fawcett, secd. Lt. (temp. Capt.) R. L. del'Strother to be Capt., vice Kilner, secd. Lt., (temp. Capt.) L. A. Drake-Brockman to be Capt., vice Rathborne, secd. Lt. (temp. Capt.) J. G. Johnstone to be Capt., vice Courtney, secd., Jan. 30th.

The following superny. Capts. are absorbed in the estabt. as specified :—E. Bamford, vice Gordon, secd. ; J. S. Hicks, vice Barnby, secd. ; (temp. Maj.) G. H. Seath, D.S.O., vice Owen, secd. ; R. A. Poland, vice Gerrard, secd., Jan. 30th.

R.N.A.S.—Temp. Prob. Flt. Officers to be temp. Flt. Sub-Lts. : W. R. D. Acland, Nov. 15th, 1916 L. H. Slatter, Nov. 29th, 1916. H. W. Taylor, H. F. Stackard, Dec. 7th, 1916. H. R. de Wilde, Dec. 27th, 1916.

War Office, Mar. 6th.

REGULAR FORCES. — Establishments. — R.F.C. — Sqdn. Comdrs.—From Flt. Comdrs., and to be temp. Majs. whilst so empld.—Capt. G. R. Howard, D.S.O., Essex R., Spec. Res., Jan. 5th. Capt. H. B. Davey, M.C., N. Staff. R., T.F., Jan. 7th. Lt. (temp. Capt.) V. D. Bell, Spec. Res., Feb. 1st. Capt. J. U. Kelly, D.S.O., Wilts R., Feb. 3rd.

Flight Comdrs.—Temp. Sec. Lt. R. W. Scoles, Gen. List, from a Flying Officer, and to be temp. Capt. whilst so empld., Feb. 16th.

Flying Officers.—Temp. Lt. H. H. W. Bean, North'd Fus., and to be transfd. to Gen. List ; Lt. F. R. R. Woodward, Lan. Fus., Spec. Res., and to be secd. ; Sec. Lt. (temp. Lt.) A. W. Martin, York. R., T.F., and to be secd. ; Temp. Sec. Lt. L. Murray-Stewart, R. Highrs., and to be transfd. to Gen. List ; Temp. Sec. Lt. W. G. Barker, M.C., Gen. List, from a Flying Officer (Observer), sen. from Sept. 22nd, 1916, Feb. 14th. Temp. Sec. Lt. A. Roulstone, Notts. and Derby R., and to be transfd. to Gen. List ; Sec. Lt. (on prob.) R. E. Littell, Spec. Res., Feb. 15th. Temp. Sec. Lt. D. B. King, attd. L'pool R., and to be transfd. to Gen List, Feb. 16th.

Balloon Officers.—Temp. Lt. G. S. M. Warlow, Army Cyclist Corps., and to be transfd. to Gen. List, Jan. 2nd., sen. from June 6th, 1916. Temp. Sec. Lt. R. P. Lamb, Rif. Brig., and to be transfd. to the Gen. List, Jan. 3rd. Sec. Lt. C. T. S. Mendl, Devon. R., Spec. Res., and to be secd. ; Sec. Lt. (on prob.) A. J. J. Lamb, Spec. Res., Jan. 17th. Temp. Sec. Lt. (on prob.) M. L. J. Daly, Gen. List ; Sec. Lt. B. H. Morrison, Unattd. List, Ind. Army, Jan. 31st.

Park Comdr.—The appt. of Lt. (temp. Maj L M Bennett, Spec. Res., notified in the "Gazette" of Feb. 3rd, is antedated to Jan. 9th.

Equipment Officers, 3rd Cl.—Sec. Lt. (temp. Lt.) F. G. Brown, R.F.A., T.F., and to be secd., Dec. 15th, 1916. The notification in the "Gazette" of Jan. 15th, 1917, regarding Lt. F. G. Brown, R.F.A., T.F., is cancelled ; Sec. Lt. E. W. Walford, Spec. Res., Jan. 8th. Sec. Lt. H. A. C. Parker, Spec. Res., Feb. 1st. Sec. Lt. F. M. Harding, Spec. Res., Feb. 8th.

Memorandum.—Temp. Sec. Lt. H. Bromley, R.E., to be temp. Capt. whilst empld. with R.F.C., Feb. 2nd.

TERRITORIAL FORCE.—R.G.A.—Sec. Lt. W. O. B. Winkler, is secd. for duty with the R.F.C., Feb. 19th.

Infantry.—Manchester R.—Sec. Lt. E. W. Lindley is secd. for duty with the R.F.C., Jan. 31st.

London R.—Sec. Lt. V. Wigg is secd. for duty with the R.F.C., Jan. 31st, 1917. Sec. Lt. (temp. Lt.) J. L. Blackwood is secd. with the R.F.C., Jan. 23rd.

* * *

From the "London Gazette" Supplement, March 7th, 1917.

War Office, March 7th,

REGULAR FORCES.—Establishments.—R.F.C.—Military Wing—Wing Comdrs.—Maj. F. J. L. Cogan, R.A., from a Sqdn. Comdr., and to be temp. Lt.-Col. whilst so empld., Feb. 8th.

Flying Officers.—Sec. Lt. (on prob.) H. G. Ross, R.E., T.F., and to be secd. ; temp. Sec. Lt. H. E. Hervey, Gen. List, from a Flying Officer (Observer), with seny. from June 14th, 1916. Sec. Lt. (on prob.) N. H. England, Spec. Res., Feb. 13th.

Lt. R. G. Bennett, Spec. Res., from an Equipment Officer, 3rd Cl. ; temp. Sec. Lt. (on prob.) S. J. Stewart, Gen. List ; temp. Sec. Lt. W. Mason, Gen. List, Feb. 14th. Temp. Sec. Lt. (on prob.) W. S. Morrison, Gen. List, Feb. 15th.

Flying Officers (Observers).—Lt. F. L. B. Hebbert, R.F.A., Spec. Res., Aug. 25th, 1916. Notification in "Gazette" of Sept. 14th, 1916, regarding temp. Lt. F. L. B. Hebbert, R.F.A., is cancelled ; temp. Sec. Lt. H. J. Bennett, Gen. List, Jan. 23rd, but with seny. from Oct. 15th, 1916. Temp. Lt. E. L. Burrell, Gen. List, Dec. 28th, 1916, but with seny. from Oct. 19th, 1916.

Balloon Officers.—Capt. L. J. F. Muirhead, High. Cyclist Bn., T.F., and to be secd. ; Sec. Lt. (temp. Capt.) G. C. Cheshire, Ches. R., T.F., and to be secd., Jan. 2nd. Sec. Lt. S. Wilkinson, Spec. Res., from an Equipment Officer, 3rd Cl., Jan. 17th. Temp. Sec. Lt. P. Leigh, Gen. List ; temp. Sec. Lt. E. Holman, Gen. List, Jan. 31st. Temp. Lt. H. D. Lewis, R.A., and to be transfd. to Gen. List, seny. from June 7th, 1916. Sec. Lt. D. M. Hodgson, E. York. R., T.F., and to be secd., seny. from May 23rd, 1916, Feb. 19th.

Adjt.—Temp. Lt. H. Parker-Jervis, Rif. Brig., and to be transfd to Gen. List ; vice temp. Lt. R. C. Lane, Gen. List, Feb. 15th.

General List.—Col. J. P. Owen-Holdsworth to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Feb. 12th.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—Military Wing.—Sec. Lts. to be Lts. :—C. A. Lewis, M.C. ; (temp. Lt.) T. L. F. Burnett ; (temp. Lt.) R. W. Heath ; J. Elgood ; A. J. Hamar ; H. C. G. Watney ; F. H. Humphreys ; L. I. T. Hewer ; (temp. Lt.) C. G. Jones ; (temp. Lt.) G. L. Main ; W. E. Roe ; R. W. Young ; (temp. Capt.) R. J. Bennett ; A. H. L. Beale ; P. Arbon, Feb. 1st.

TERRITORIAL FORCE.—Infantry.—R. Scots.—Sec. Lt. R. M. H. Young is secd. for duty with the R.F.C., Jan. 31st.

Monmouth R.—Lt. (temp. Capt.) C. T. Vachell is secd. for duty with R.F.C., Jan. 31st.

* * *

From the "London Gazette" Supplement, March 8th, 1917.

War Office, March 8th.

REGULAR FORCES.—Establishments.—R.F.C.—Military Wing.—Staff Officer, 2nd Cl. (graded for pay as a Brig. Maj.) —Capt. G. B. Fraser, King Edward's Horse, Spec. Res., from an Adjt., Feb. 13th.

Sqdn. Comdr.—Maj. E. H. M. O'Farrell, R. Ir. Fus., from a Flt. Comdr., Feb. 16th.

Flying Officers.—Sec. Lt. (temp. Lt.) J. C. Macgown, Yeo., T.F., and to be secd., Feb. 13th ; Capt. G. E. Chadwick, M.C., E. Lan. R., and to remain secd. ; temp. Sec. Lt. (on prob.) (actg. Lt.) R. Cornford, Training Res. Bn., to relinquish his actg. rank, and to be transfd. to Gen. List ; Sec. Lt. A. M. Sutherland, North'd Fus., and to be secd. ; temp. Sec. Lt. K. R. Kirkman, Leic. R., and to be transfd. to Gen. List ; Capt. G. E. F. Sutton, M.C., Can. Inf. Bn., from a Flying Officer (Observer), seny. from July 13th, 1916, Feb. 14th. Temp. Sec. Lt. P. W. B. Lawrence, attd. D. of Corn. L.I., and to be transfd. to Gen. List ; temp. Sec. Lt. (on prob.) G. O. Maugham, Gen. List, Feb. 15th. Temp. Sec. Lt. F. T. Bright, Suff. R., and to be transfd. to Gen. List ; Sec. Lt. (on prob.) J. C. Smith, R. War. R., Spec. Res., and to be secd. ; Sec. Lt. (on prob.) T. P. W. Young, High. L.I., T.F., and to be secd. ; Sec. Lt. W. Whittaker, Lan. Fus., T.F., and to be secd. ; Sec. Lt. J. A. Stedman, R.F.A., T.F. ; temp. Sec. Lt. J. H. P. Kither, Gen. List, Feb. 17th. Sec. Lt. C. H. Stevens, Spec. Res. ; Sec. Lt. H. A. Hamersley, Spec. Res. ; temp. Sec. Lt. (on prob.) L. G. Harrison, Gen. List, Feb. 18th.

Flying Officers (Observers).—Lt. E. Sassoon, D. Gds., from Oct. 21st, 1915, to Jan. 9th. Lt. J. W. Sanders, Midd'x R., T.F., and to be secd., Sept. 15th, 1916, seny. from July 29th, 1916. Temp. Sec. Lt. F. W. Griffiths, attd. Midd'x R., and to be transfd. to Gen. List, Sept. 1st, 1916, seny. from July 30th, 1916. Temp. Sec. Lt. N. Cox-Walker, York R., and to be transfd. to Gen. List, Jan. 11th, seny. from Aug. 2nd, 1916. Temp. Sec. Lt. O. A. E. Allen, Suff. R., and to be transfd. to Gen. List, Feb. 20th, seny. from Sept. 16th, 1916. Temp. Sec. Lt. (on prob.) A. S. Carey, Gen. List, seny. from Oct. 15th, 1916 ; temp. Sec. Lt. A. S. Mackenzie, High. L.I., and to be transfd. to Gen. List, seny. from Oct. 17th, 1916 ; Feb. 14th. Temp. Sec. Lt. T. Johnson-Gilbert, R. Scots, and to be transfd. to Gen. List, Feb. 18th, seny. from Oct. 20th, 1916. Temp. Sec. Lt. W. G. Scotcher, M.C., attd. E. York R., and to be transfd. to Gen. List, Feb. 17th, seny. from Oct. 20th, 1916. Sec. Lt. F. W. Burdick, Lond. Divl. Cyclist Cos., and to be secd., Feb. 14th, seny. from Oct. 28th, 1916. Lt. A. S. Allan, M.C., Can. Inf. Bn., Feb. 18th, seny. from Nov. 7th, 1916. Lt. G. A. Good, Can. Inf. Bn., Feb. 15th, seny. from Nov. 9th, 1916. Temp. Sec. Lt. J. A. V. Boddy, Durh. L.I., and to be transfd. to Gen. List, Feb. 18th, seny. from Nov. 10th, 1916. Temp. Sec. Lt. (on prob.) L. L. Brown, Gen. List, Feb. 11th, seny. from Nov. 21st, 1916. Temp. Sec. Lt. (on prob.) H. R. Wilkinson, Gen. List, seny. from Nov. 21st, 1916 ; temp. Sec. Lt. (on prob.) A. C. Perryman, Midd'x R., and to be transfd. to Gen. List, seny. from Nov. 25th, 1916 ; Feb. 14th. Sec. Lt. T. Margerison, Hunts Cyclist Bn., T.F., and to be secd. ; Sec. Lt. (on prob.) H. C. Bankart, Midd'x R., Spec.

(Continued on page 692.)

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BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

VII.—A. V. ROE AND CO., LTD.

THE FIRST BRITISH CONSTRUCTOR-AVIATOR.

The war may change some of our national characteristics, but the last trait of which the average Englishman will dispossess himself is the fear of indulgence in self-advertisement. Most of our pioneer aviators come under the spell, and in gathering the biographical data for this series of articles I have usually found the utmost readiness to impart any information which might redound to the credit of a firm, *qua* firm, but an amazing reluctance to mention anything in the nature of personal achievement.

Thus it was that Mr. A. V. Roe, a pioneer of pioneers, though referring to the fact that he "managed to get some small hops" at Brooklands in 1908, modestly refrained from mentioning the truly important fact that June of that year marked the first occasion in which a British aviator had risen from the ground in England on an aeroplane. And to this interesting fact must be added the scarcely less interesting details that it was a British machine (barring the engine), and was designed and built by himself.

To Mr. A. V. Roe, therefore, belongs the proud record of being the first builder-pilot in this country. In the face of many adverse strokes of fortune—for he has never been blessed with a superabundance of good luck—this enviable distinction must afford him an enduring solace.

Mr. A V. Roe.

THE BENEFITS OF MARINE TRAINING.

A marine engineer at the outset, Mr. Roe first turned his thoughts towards aviation while actually at sea, and made a model on albatross lines. Its tail was not set sufficiently far back, however, and it proved very unstable.

Then he made numerous gliders of every imaginary type, including triplanes and multiplanes, and obtained the best results from the sloped-back wing types, and those with the centre pressure right forward, and an upward pressure on the tail.

THE FIRST FLYING PRIZE.

Then came along the "Daily Mail" offer (in 1906) of £300 for the best model aeroplane. Within ten days he had made a 3 ft. by 3 ft. model, and had it flying. Being in London at the time, he entered this for the competition, but as there were over two hundred entries, he felt that his chances were very small. However, a survey of the models at the Agricultural Hall caused his confidence to grow, as with the exception of the beautifully made Clarke, and the Weiss gliders, they struck him as being mostly freakish.

In what was virtually a preliminary "appearance" competition for medals he was unsuccessful, but, when the actual flying trials came on, his model was easily first. The judges, however, thought the design so ridiculously simple that they withheld the first prize and awarded him the second (£75).

A FULL-SIZE ATTEMPT.

This sufficed to encourage Mr. Roe to build a full-sized model. It was of the front elevator type, with a big single plane forward, and a biplane at the back. Putting up a shed at Brooklands, he made his first attempts at actual flight on the track with the historic result already mentioned. The machine actually lifted him and itself off the track for some yards.

The engine was a 24-h.p. 8-cylinder Antoinette, and weighed 98 lb., without the radiator. The cylinder heads were of aluminium. It is worthy of record that Mr. Roe built this aeroplane and fitted the engine entirely with his own hands.

THE TRIALS OF A PIONEER.

Scanty, indeed, was the encouragement offered to experimenters in those days by the Brooklands management. Mr. Roe had to turn up at 4 a.m., and it used to take him two hours to get the machine out single-handed, and another couple of hours to house it again. If he had not finished his attempts on the track before anyone turned up with a car there were "ructions."

He was not even supposed to sleep there, but, as a matter of fact, after passing the gatekeeper at night, he used to climb over the fence and get back to his shed! Eventually, he received notice to quit, as the shed was wanted on race days; he had to sell it for £15, though, nowadays, it would probably not be parted with at £50. To crown all, the policeman who moved the machine out of the way one race day broke it accidentally.

WAR OFFICE DISCOURAGEMENT.

Undaunted by this rebuff, Mr. Roe tried to get permission to continue his experiments on Laffan's Plain, but the War Department replied that this was out of the question. As Mr. Roe remarked, "They were letting an American experiment there, while an Englishman had to go where he could get."

He looked at a map of London, picked out Lea Marshes as a likely spot, and rented a couple of railway arches, of which he boarded up the ends.

A Second Effort.

Then he made a new machine, putting it together in his brother's stables at West Hill, Putney. It was a small triplane, fitted with a 9-h.p. J.A.P. engine. The planes were covered with yellow paper, costing about twopence per square yard!

Could any greater contrast be drawn between the primitive expedients of a struggling pioneer and modern developments, when the leading lights of the aircraft world assemble to discuss the latter-day refinements of "dope"?

Feminine Courage.

It was while experimenting with this machine by the River Lea that Mr. Roe received one of the most extraordinary letters on record. It was from a distraught female who wished to commit suicide, but she asked permission to fly the machine in order that before relinquishing this life she might effect some useful purpose.

The reply was in the negative, for, as Mr. Roe pointed out, the lady might smash the machine! He offered, however, to give her a chance when he had perfected it.

The Authorities Convinced.

Then the authorities discovered that he was experimenting on their sacred ground. There were no racing motorcars to be considered, as at Brooklands, but the triplane caused the tramps to move to one side, and that was unthinkable. So keepers were set to watch, and, at length, bagged their quarry.

Just as police-court proceedings were about to be undertaken news came that M. Blériot had flown the Channel, and the authorities forbore from making themselves ridiculons. For the sake of dramatic completeness, it was a pity that Mr. Roe had not been captured a day or two earlier. The spectacle of a British pioneer in the dock would have shed much lustre on official encouragement of aviation by comparison with the state of things in France and M. Blériot's success.

The Blackpool Meeting.

Having got sundry hops and tiny flights out of the machine, Mr. Roe took it to the Blackpool meeting of 1909, and I have only too vivid a recollection of the contrast between his efforts to get the triplane to rise and the performances of Latham and Henri Farman. But Mr. Roe did at least try, whereas there were several other machines which never left their hangars.

Mr. H. V. Roe.

At Blackpool Mr Roe was reproached by Mr. Hamilton Fyfe, of the "Mail," for "working on his own lines," and was asked why he did not "copy Henri Farman." His reply was: "If you were to ask Farman to try to build an aeroplane with my finances and this 9-h.p. J.A.P., I think he would find it a bit of a problem."

Apart from financial considerations, moreover, Mr. Roe believed in putting the engine and tank in front of the pilot inside a proper streamline body.

For a brief period Mr. Roe continued his efforts at Wembley Park, but early in 1910 moved back to Brooklands, the attitude of the B.A.R.C. towards aviation having by this time undergone a change, thanks largely to the foresight of Major Lindsay Lloyd.

The Partnership of the Roe Brothers.

Entering into partnership with his brother, Mr. H. V. Roe, who established the present works at Manchester, and pledged the success of his own lucrative business in doing so, he was thereby relieved of immediate financial embarrassments. It may be said here that the success of the firm of A. V. Roe and Co., Ltd., has been largely due to the loyal support which Mr. H. V. Roe has accorded to the inventive genius and untiring experiments of Mr. A. V. Roe.

The 35-h.p. Triplane.

The next machine to be built was a small triplane with a 35-h.p. J.A.P. engine, which threw out so much oil that, after a few minutes' flying, the pilot had to "wink his way."

The machine, however, gave promising results, being naturally very stable, and answering her controls beautifully. Having obtained from her a 24 minutes' flight, Mr. A. V. Roe decided to take her to the second Blackpool meeting, along with a sister machine which he had meanwhile built as a two-seater.

More Bad Luck.

Unkind fate even yet pursued him. When an aeroplane is burnt nowadays by causes incidental to a flight the pilot may accept the fact with becoming philosophy if he himself has escaped unhurt, and hunt around for another machine. But when a spark from a railway locomotive sets a train on fire, and that fire is confined to two trucks carrying aeroplanes on which a pioneer's best hopes are fixed, the situation verges on the tragic.

Such, however, was what happened to the train conveying Mr. Roe's new machines to Blackpool. None the less, after a look at the débris, he decided on an attempt to reconstruct a machine out of the remnants left in the works.

Indomitable Pluck.

He and his men worked night and day for four days, and by that time had got together something which they could put on another train for Blackpool. They arrived there at three in the afternoon and resumed work. On Monday morning a new engine—a 35-h.p. Green—arrived about ten o'clock, and was rapidly fitted up, and by 2.0 the machine was in the air.

It was Bank Holiday, and there was a big crowd, but whether they or Mr. Roe himself found the flight the more thrilling is matter for conjecture. As he was rising, one of the tyres went "pop"; another soon followed suit, and then a third. Mr. Roe managed to make 2½ circuits of the ground, wobbling all over the crowd, who cheered him just as freely as they had jeered the year before. The machine was quite uncontrollable, and he doubted whether he would ever get her back again; however, he succeeded in effecting a landing without disaster.

He never received a penny, by the way, as compensation from the railway, and as the point had never been contested in the courts as to the liability or otherwise of a railway company for damage through engine sparks, he was not wealthy enough to fight the question on his own account.

A Visit to America.

During the Blackpool meeting he got married; and then, as it happened, was induced almost immediately to go to America, along with Mr. C. Grahame-White. The British party were very well treated there, but at Boston Mr. Roe had some pretty bad smashes on a new triplane which had been built on the lines of the Blackpool machine, and he finished up the visit in hospital.

Setting the Fashion.

On his return to England, the Avro firm produced the wonderful little biplane with the 35-h.p. Green engine, which set the fashion to the whole world, in tractor biplanes, and on it many notable aviators first learned to fly.

Later, he brought out the 50-h.p. Gnome Avro, which the War Office eventually accepted in 1911. Then came an order from the Government for two more, and, subsequently, for ten others in all. The type was really the forerunner of the famous 80-h.p. Avro tractor as known to-day.

Military Trials.

In 1912 the "totally enclosed" Avro with the 60-h.p. Green engine was built, and entered for the Military Trials. "If," Mr. Roe now says, "we had only been able to fit an 80-h.p. engine, we should have walked away with everything."

Early in the Trials, when the late Lieut. Wilfred Parke, R.N., the pilot, was landing with the wind behind, he struck a hillock, and the machine was practically "smashed to smithereens," but the pilot, being strapped to his seat, was not even scratched. Bad weather allowed the machine to be rebuilt, a feat on which the works manager, Mr. Parratt, deserves to be congratulated.

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It then put up a very good show, except in the climbing contest, but with a little less than full load she did 300 ft. per minute. Subsequently, the machine made a 7½ hours' continuous flight, with Mr. F. P. Raynham as pilot, and beat the existing Duration Record for all-British machines.

The Famous Eighty.

Then came the 80-h.p. Avro, with the Gnome engine, on which Mr. F. P. Raynham broke all speed range records at Hendon. The machine had a remarkable slow speed, and the pilot caused no little sensation by circling the track at a comparative crawl, and then suddenly launching out and working up to 84 m.p.h. Save for minor details, however, the machine was identical in design with the 50-h.p.

For his own amusement's sake, Mr. Raynham, on the "Eighty," did a glide, with his engine stopped, all the way from above Brooklands to Hendon, a matter of 21 miles. He started at an altitude of about 14,000 ft., and was still at 5,000 ft. when he arrived over the Hendon aerodrome.

Despite the interest which the machine had attracted to itself by its performances, it was going about practically without any orders until after the war.

Recognition in Germany.

Meanwhile, A. V. Roe and Co., Ltd., had turned their attention to another sphere. They were in very low water, and inclined to cease operations altogether, when a timely order came from Germany for a seaplane.

When completed, this proved a success, and was the first machine to fly across from the mainland to Heligoland. An order for seaplanes followed later from our own Admiralty, and delivery of these had just been started when the war broke out.

A National Asset.

Since then, the firm has been busy on War Office and Admiralty work alike, building various types of Service machines, and turning out numerous 80-h.p. Avros for school purposes.

The firm's progress has been greatly assisted by the loyalty of the staff, among whom Mr. R. S. Parratt, the works manager, and Mr. R. Chadwick, the chief draughtsman, deserve special mention.

The fact that there was no possible site for an aerodrome within a dozen miles of Manchester led Mr. A. V. Roe to look about for a suitable spot down south, and, eventually, he discovered one to his liking on the Coast. The land was acquired, and building was begun in June, 1916, culminating in the erection of one of the finest workshops in the country.

War Service.

This review of Avro progress would be incomplete, of course, without some reference to two outstanding achievements in the earlier days of the war, although the facts will be within the recollection of the majority of the readers of The Aeroplane.

It was on Avros, with 80-h.p. Gnomes, that the memorable and effective raid was made on the Zeppelin sheds at Friedrichshafen. Four machines were built at the Manchester works, and, without even being tested, were transported in crates to Belfort, in south-eastern France.

There they were taken out and assembled, and three of them set off almost at once, in the depth of winter, for an objective some 150 miles away, with a result that all the world knows. Incidentally it may be remarked that Squadron-Commander Briggs, who was wounded and taken prisoner, was fully determined to make sure of his work by getting low enough to place his bombs, and quite expected to lose his life in the attempt.

The First Zeppelin Bagged.

It was also on an Avro that Flight-Lieut. Bigsworth scored the honour of being the first pilot to drop bombs on a Zeppelin in mid-air, and cause its destruction, though the late Flight Sub-Lieut. Warneford, V.C., on a Morane, was the first to bring a Zeppelin down in flames. In the former case, the bombs went clean through the Zeppelin and did serious damage without setting it on fire.

The airship made for its shed, but it was ascertained some time later that it was wrecked when trying to land, and utterly destroyed.

No one, of course, would for a moment, make any comparisons as to these glorious episodes, or dispute the heroism of either pilot; it is merely as a matter of history that both achievements have to be recorded, and the more especially as no mention was made in the Press of the earlier of the two, whereas Sub-Lieut. Warneford's was at once acknowledged by the Admiralty, and attracted universal attention.

Present Extensions.

The Avro firm has, in common with all the early aeroplane makers, extended enormously in size, and extensions at present in progress should make it not only one of the first but one of the biggest aircraft concerns in the world. The quality of Avro work is recognised as being of the highest, and Mr. A. V. Roe's fertile brain may be depended upon to keep the firm's designs also in the front rank.

* * *

THE NEXT MEETING OF THE AERONAUTICAL SOCIETY.

Owing to the difficulty in obtaining good films in the present dull weather, the lecture announced for March 21st. by Mr. Holt Thomas, on "Commercial Aeronautics," has been postponed until May 20th.

Mr. M. A. S. Riach will deliver his paper on "Air Screws" on March the 21st.

ALL ABOUT THE RENAULT ENGINE.

The directors of Wolseley Motors, Ltd., have just placed upon the market a useful Hand-Book of Instruction on the Wolseley-Renault aero-engine of the 70, 75, and 80 h.p. types.

The photographs and drawings are excellent in quality, and together with the descriptive matter should be very useful to the users of Wolseley-Renault aero-engines who wish to learn the different points in the care and running of the different types.

After a general description and comparison of the different types several chapters are devoted to the various functions of the engines. The chapter on lubrication explains how the oil is fed to the bearings, and which parts require manual lubrication.

A chapter on ignition explains the types of magnetos employed and gives useful information as to how the magneto works, a department of electrical knowledge with which many of those ultimately concerned with aviation, or indeed with motoring of any kind, are surprisingly ignorant. The instructions upon the care of the platinum points and so forth is a feature which has frequently been neglected in other aero-engine manuals.

The firing diagrams supplied are very clear and easily appreciated. One of the makes of magnetos fitted to these engines is the A.8 magneto made by the British Thomson-Houston Co., which is very similar in pattern to the old Bosch H.L.8. Directions are given for the detection and correction of ignition trouble.

Special attention is devoted to the most important question of carburation and copious explanations are given on the why and wherefore of this department of the engine. The carburettors used are of Claudel-Hobson make, R.A.F. automatic type.

A clear explanation is given of the conditions covering economical fuel consumption, and a little heed taken of this aspect of the question is not to be despised, because once a pilot gets into the habit of getting as many miles as possible to a tank of fuel, he is much less likely to be caught short.

A chapter devoted to the dismantling of the engine is of considerable importance, because attention paid to the proper ordering of this task will save considerable time and temper.

The final chapter is devoted to the important task of examination and assembly, and gives a key to the places where trouble may be found when the engine is dismantled, and the instructions for assembly are particularly useful, because, with an air-cooled stationary engine with the cylinders held in place by colonette bolts, unscientific erection is more than likely to result in the distortion of the cylinders, and possibly breakage.

A large number of copies of this book have been ordered by the War Department for distribution to the various aviation centres using this type of engine, but permission has been received for it to be published in the usual way, and copies may be obtained at five shillings each from Wolseley Motors, Ltd., Adderley Park, Birmingham, or ordered through any bookseller.

THE BLACKBURN WORKS MAGAZINE.

The second number of the "Olympian," the organ of the house of Blackburn of Leeds, is a distinct advance on the first edition, excellent as it was, and to judge by the encouraging remarks made on the editorial page it is clear that this literary institution has already found favour in the works.

The No. 2 picture in the Portrait Gallery is a photograph of Mr. Stuart A. Hirst.

The second instalment of a really able article on Aeroplane Design gives a method for calculating the centre of gravity of an aeroplane.

The Editor will be pleased to send copies of the "Olympian" to old hands, and others interested, upon the receipt of 4d. in stamps in payment for each copy required. Communications should be directed to Mr. G. E. Petty, c/o the Blackburn Aeroplane and Motor Co., Ltd., Leeds.

CONGRATULATIONS.

KEMP-WALTON—MADDOX.—On Mar. 7th, at St. Hilda's, Croston Park, Brockley, Thomas Kemp-Walton, of the Grahame-White Aviation Co., Ltd., was married to Jesse Hartie Horsburgh Maddox, second daughter of the late Arnold G. Maddox, B.A., B.Sc., of Forest Hill, S.E., and Mrs. Maddox, of Honor Oak Park. The ceremony was performed by the Rev. C. Courtney Weekes, M.R.C.S., L.R.C.P.

Among the presents was a very handsome Queen Anne silver tea set, presented by the employees and staff of the Grahame-White Aviation Co., Ltd.

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PRACTICAL SCIENCE IN AIRCRAFT TESTING.

On March 7th a paper was read before the Aeronautical Society of Great Britain by Capt. H. T. Tizard, R.F.C., of the Test Squadron C.F.S., on "Methods of Measuring Aircraft Performances."

Of all lectures delivered before the Society none has been of greater interest, both to pilots and manufacturers, and it is greatly to be regretted that, though the hall of the Royal Society of Arts was well filled, it was not packed, as it has been on previous occasions.

Many test pilots would have learned much to their advantage about the inaccuracy of their results, and many manufacturers might have been cured of some of their optimism on the subject of performances. Capt. Tizard is evidently one of those fortunate individuals who is able to use scientific knowledge for practical purposes, as differentiated from the type of man to whom science is itself an end. When a man of practical experience regards a slide-rule, or a microscope, or a barometer as a useful but somewhat unreliable tool rather than a sacred instrument of infallible precision, one cannot label him with the epithet "scientist," at any rate in that spirit which Capt. Tizard appeared, in a remark during his lecture, to regard as conveying a certain opprobrium.

The practical science of aeronautics can well do with experimenters who employ scientific methods in the investigation of matters of practical importance, and no more convincing exposition of the benefits to be derived from such methods has been given than by Capt. Tizard in the lecture which follows.

General Ruck took the chair, in the absence of Lord Sydenham whom he stated was most unfortunately absent owing to a chill. He said that Lord Sydenham had promised to take the chair on another occasion.

General Ruck announced that at the invitation of the Countess of Drogheda, the Aeronautical Society of Great Britain, the Royal Aero Club, and the Society of British Aircraft Constructors will hold an "At Home" at the Aircraft History Exhibition, at the Grosvenor Galleries, New Bond Street, W., on Thursday, March 15th, at 8.30 p.m.

Short addresses on Aeronautics will be given by Brig.-Gen. W. S. Brancker, Lieut.-Col. Mervyn O'Gorman, C.B., and others. Cinematograph films of parachute descents will also be shown. As the meeting is primarily for the benefit of the Flying Services' Fund and Lady Henderson's Royal Flying Corps Committee, members of the various institutions will be charged 2s. 6d., and any visitors they may care to bring will be charged 5s. per head.

General Ruck stated, amid applause, that Lady Drogheda, who had done much good work for aeronautics, had been co-opted to the Council of the Aeronautical Society.

The Chairman then introduced Capt. Tizard, who proceeded as follows:—

Aeroplane Testing.

The accurate testing of aeroplanes is one of the many branches of aeronautics which have been greatly developed during the war, and especially during the last year. For some months after the war began, a climb to 3,000 to 5,000 feet by aneroid and a run over a speed course was considered quite a sufficient test of a new aeroplane; now we all realise that for military reasons certainly, and probably for commercial reasons in the future, it is the performance of a machine at far greater heights with which we are mainly concerned.

In this paper I propose to give a short general account of some of the methods of testing now in use at the Testing Squadron of the Royal Flying Corps, and to indicate the way in which results of actual tests may be reduced, so as to represent as accurately as possible the performance of a machine independently of abnormal weather conditions, and of the time of the year. For obvious reasons full details of the tests and methods employed cannot yet be given.

So far as England is concerned, I believe that the general principles of what may be called the scientific testing of aeroplanes were first laid down at the Royal Aircraft Factory. Our methods of reduction were based on theirs to a considerable extent, with modifications that were agreed upon between us; they have been still further modified since, and recently a joint discussion of the points at issue has led to the naval and military tests being co-ordinated, so that all official tests are now reduced to the same standard.

It should be emphasised that once the methods are thought out, scientific testing does not really demand any high degree of scientific knowledge; in the end the accuracy of the results really depends upon the pilot, who must be prepared to exercise a care and patience unnecessary in ordinary flying. Get careful pilots whose judgment and reliability you can trust, and your task is comparatively easy; get careless pilots and it is impossible.

At the outset it may be useful to point out by an example the nature of the problems that arise in aeroplane testing. Suppose that it is desired to find out which of two wing sections is most suitable for a given aeroplane. The aeroplane is tested with one set of wings, which are then replaced by the other set, and the tests repeated some days later. The results might be expressed thus:—

	A Wings.	B Wings.
Speed at 10,000 ft.	90 m.p.h.	93 m.p.h.
Rate of climb at 10,000 ft.	250ft. a minute.	300ft. a minute.

Now, the intelligent designer knows, that firstly an aneroid may indicate extremely misleading "heights," and secondly, that even if the actual height above the ground is the same in the two tests the actual conditions of atmospheric pressure and temperature may have been very different on the two days.

He will, therefore, say, if he is an intelligent designer, as all British designers are now, what does that 10,000 mean? Do you mean that your aneroid read 10,000 feet, or do you mean 10,000 feet above the spot you started from, or 10,000 feet above sea level? If he proceeds to think a trifle further, he will say—what was the density of the atmosphere at your 10,000 feet; was it the same in the two tests? If not, the results do not convey much.

There he will touch the keynote of the whole problem, for it is on the density of the atmosphere that the whole performance of an aeroplane depends; the power of the engine and the efficiency of the machine depend essentially on the density, the resistance to the motion of the machine through the air is proportional to the density, and so finally is the lift on the wings. None of these properties are proportional solely to the pressure of the atmosphere, but to the density, that is the weight of air actually present in unit volume.

It follows that it is essential when comparing the performances of machines to compare them as far as possible under the same conditions of atmospheric density, not as is loosely done at the same height above the earth, since the density of the atmosphere at the same height above the earth may vary considerably on different days, and on the same day at different places.

At the same time, in expressing the final results, this principle may be carried too far. Thus, if the speed of a machine were expressed as 40 metres a second at a density of 0.8 kilogrammes per cubic metre, the statement, though it may be strictly and scientifically accurate, will convey nothing to 99 per cent. of those directly concerned with the results of the test. Even the G.O.C. in France might object to the form of the report.

The result is rendered intelligible and indeed useful by the form "90 m.p.h. at 10,000 feet," or whatever it is. With this form of statement, in order that all the statements of results may be consistent and comparative, we must be careful to mean by "10,000 feet" a certain definite density, in fact, the average density of the atmosphere at a height of 10,000 feet above mean sea level. This is what the problem of "reduction" of tests boils down to; what is the relation between atmospheric density and height above sea level? This knowledge is obtained from meteorological observations. We have collected all the available data—mostly unpublished—with results shown in the following table:

TABLE I.

Mean Atmospheric Pressure, Temperature and Density at Various Heights Above Sea Level.

Height in kilometres.	Height in equivalent feet.	Mean pressure in millibars.	Mean temp. in absolute degrees centigrades.	Mean density in kgm. per cubic metre.
0	0	1,014	282	1.253
1	3,280	900	278	1.128
2	6,560	795	273	1.014
3	9,840	699	268	0.909
4	13,120	615	262	0.818
5	16,400	568	255	0.735
6	19,680	469	248	0.658
7	22,960	407	241	0.589

These are the mean results of a long series of actual observations made mainly by Dr. J. S. Dines. It is convenient to choose some density as standard, call it unity, and refer all other densities as fractions or percentages of this "standard density." We have taken, in conformity with the R.A.F., the density of dry air at 760 mm. pressure and 16 deg. of centigrade as our standard density; it is 1.221 kgm. per cubic metre. The reason this standard has been taken is that the air speed indicators in use are so constructed as to read correctly at this density, assuming the law:—

$$p = \frac{1}{2} \rho V^2$$

where V is the air speed, p the pressure obtained, ρ the standard density.

In some ways it would doubtless be more convenient to take the average density at sea level as the standard density, but it

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does not really matter what you take so long as you make your units quite clear. Translated into feet, and fraction of the standard density the above table becomes :—

TABLE II.

Height in feet.	Percentage of standard density.	Height in feet.	Percentage of standard density.
0	102.6	11,000	71.7
1,000	99.4	12,000	69.5
2,000	96.3	*13,000	67.3
3,000	93.2	14,000	65·2
4,000	90.3	15·000	63,0
5,000	87.4	16,000	61.1
6,000	84.6	*16,500	60.1
*6,500	83.3	17,000	59.1
7,000	81.9	18,000	57.1
8,000	79.2	19,000	55.2
9,000	76.5	20,000	53.3
*10,000	74.0		

* 6,500 feet is introduced as corresponding roughly to the French test height of 2,000 metres. 10,000 feet similarly corresponds roughly to comparing aeroplane test performances with the French standard of 3,000 metres, and similarly for 13,000 and 16,500 feet.

Let us briefly consider what these figures mean. For example, we say that the density at 10,000 feet is 74 per cent. of our standard density, but it is not meant that at 10,000 feet above mean sea level the atmospheric density will always be 74 per cent. of the standard density. Unfortunately for aeroplane tests this is far from true.

The atmospheric density at any particular height may vary considerably from season to season, from day to day, and even from hour to hour; what we do mean is that if the density at 10,000 feet could be measured every day, then the average of the results would be, as closely as we can tell at present, 74 per cent. of the standard density.

The above table may therefore be taken to represent the conditions prevailing in a "normal" or "standard" atmosphere, and we endeavour, in order to obtain a strict basis of comparison, to reduce all observed aeroplane performances to this standard atmosphere, i.e., to express the final results as the performance which may be expected of the aeroplane on a day on which the atmospheric density at every point is equal to the average density at the point. Some days the aeroplane may put up a better performance, some days a worse, but on the average, if the engine power and other characteristics of the aeroplane remain the same, its performance will be that given.

It must be remembered that a standard atmosphere is a very abnormal occurrence; besides changes in density there may occur up and down air currents which exaggerate or diminish the performance of an aeroplane, and which must be taken carefully into account. They show themselves in an otherwise unaccountable increase or decrease in rate of climb or in full speed flying level at a particular height.

ACTUAL TESTS.

We now pass to the actual tests, beginning with a description of the observations which have to be made and thereafter to the instruments necessary. The tests resolve themselves mainly into

(a) A climbing test at the maximum rate of climb for the machine.

(b) Speed tests at various heights from the "ground" or some other agreed low level upwards.

Experience agrees with theory in showing that the best climb is obtained by keeping that which is frequently called the air speed of an aeroplane, viz., the indications of the ordinary air speed indicator, nearly constant whatever the height. (In other words pV^2 is kept constant.) We can look at this in this way.

There is a limiting height for every aeroplane above which it cannot climb; at this limiting height, called the "ceiling" of the machine, there is only one speed at which the aeroplane will fly level; at any other air speed higher or lower it will descend.

Suppose this speed be 55 m.p.h. on the air speed indicator. Then the best rate of climb from the ground is obtained by keeping the speed of the machine to a steady indicated 55 m.p.h.

Fortunately a variation in the speed does not make very much difference to the rate of climb; for instance, a B.E.2c with a maximum rate of climb at 53 m.p.h. climbs just as fast up, say, to 5,000 feet at about 58 m.p.h. This is fortunate, as it requires considerable concentration to keep climbing at a steady air speed, especially with a light scout machine; if the air is at all "bumpy," it is impossible.

At great heights the air is usually very steady, and it is much easier to keep to one steady air speed.

RATE OF CLIMB.

It is often difficult to judge the best climbing speed of a new machine; fliers differ very much on this point, as on most. The Testing Squadron, therefore, introduced some time ago a "rate of climb" indicator, intended to show the pilot when he is climbing at the maximum rate.

It consists of a thermos flask, communicating with the outer air through a thermometer tube leak. A liquid pressure gauge of small bore indicates the difference of pressure between the inside and outside of the vessel. Now, when climbing, the atmospheric pressure is diminishing steadily; the pressure inside the thermos flask tends, therefore, to become greater than the outside atmospheric pressure. It goes on increasing until air is being forced out through the thermometer tubing at such a rate that the rate of change of pressure inside the flask is equal to the rate of change of atmospheric pressure due to climbing. When climbing at a maximum rate, therefore, the pressure inside the thermos flask is a maximum. The pilot, therefore, varies his air speed until the liquid in the gauge is as high as possible, and this is the best climbing speed for the machine.

REDUCTION TO STANDARD.

What observations during the test are necessary in order that the results may be reduced to the standard atmosphere? Firstly, we want the time from the start read at intervals, and the height reached noted at the same time. Here we encounter a difficulty at once, for there is no instrument which records height with accuracy.

The aneroid is an old friend now of aeronauts as well as of mountaineers, but it is doubtful whether 1 per cent. of those who use it daily realise how extraordinarily rare it is that it ever does what it is supposed to do—that is, indicate the correct height above the ground, or starting place.

The faults of the aeroplane aneroid are partly unavoidable and partly due to those who first laid down the conditions of its manufacture. An aneroid is an instrument which in the first place measures only the pressure of the surrounding air. Now, if p_1 and p_2 are the pressures at two points in the atmosphere, the difference of height between these points is given very closely by the relation,

$$h \propto \theta \log_e {}^{p1}/_{p2}$$

where θ is the average temperature, expressed in "absolute" degrees, of the air between the two points.

It is obvious that, if we wish to graduate an aneroid in feet, we must choose arbitrarily some value for θ. The temperature that was originally chosen for aeroplane aneroids was 50 degrees Fahrenheit or 10 degrees centigrade.

THE DEFECTIVE ANEROID.

An aneroid, as now graduated, will therefore only read the correct height in feet if the atmosphere has a uniform temperature of 50 degrees Fahrenheit from the ground upwards, and it will be the more inaccurate the greater the average temperature between the ground and the height reached differs from 50 degrees Fahrenheit.

Unfortunately 50 degrees Fahrenheit is much too high an average temperature; to take an extreme example, it is only on the hottest days in summer, and even then very rarely, that the average temperature between the ground and 20,000 feet will be as high as 50 degrees Fahrenheit. On these very rare occasions an aneroid will read approximately correctly at high altitudes; otherwise it will always read too high. In winter it may read on cold days 2,000 feet too high at 16,000 feet—i,e., it will indicated a height of 18,000 feet when the real height is only 16,000 feet. It is always necessary, therefore, to "correct" the aneroid readings for temperature. This is very disappointing to the pilot who thinks he has been up to 20,000 feet on a cold day and finds he has only been to 17,500 feet. The equation

$$H = \frac{273 + t}{283} . h.$$

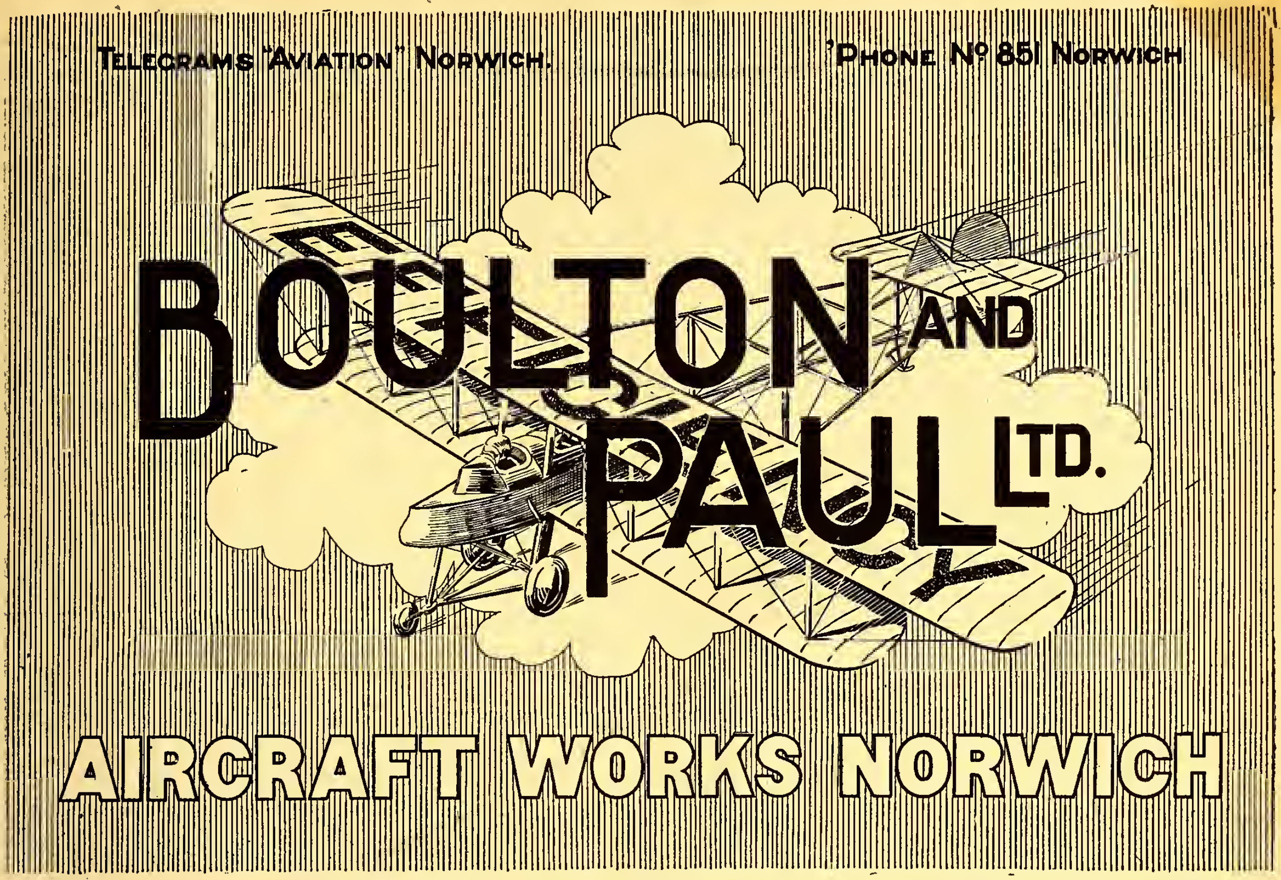
gives us the necessary correction. Here H is the true difference in height between any two points, t the average temperature in degrees centigrade between the points, and h the difference in height indicated by aneroid. It is convenient to draw a curve showing the necessary correction factors at different temperatures, some of which are given in the following table :—

TABLE III.

ANEROID CORRECTION FACTORS.

Temperature.	Correction factor.
70° Fahr.	1.040
50° „	1.000
30° „	0.961
10° „	0.922
— 10° „	0.883

For example, if a climb is made through 1,000 feet by aneroid, and the average temperature is 10 deg. Fahr., the actual distance is only 1,000 × 0.922 = 922 feet. The above equation is probably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quite accurate enough for small differences of height—up to 1,000 feet say—and approximately so for bigger differences.

The magnitude of the correction which may be necessary shows how important it is that observations of temperature should be made during every test. For this purpose a special thermometer is attached to a strut of the machine, well away from the fuselage, and so clear of any warm air which may come from the engine. The French, I believe, do not measure temperature, but note the ground temperature at the start of a test, and assume a uniform fall of temperature with height.

This, undoubtedly, may lead to serious errors. The change of temperature with height is usually very irregular, and only becomes fairly regular at heights well above 10,000 feet. It is not safe to assume a 3 deg. drop in temperature per 1,000 feet, as some test stations do.

The Real Test.

The aneriod being what it is, one soon comes to the conclusion that the only way to make use of it in aeroplane tests is to treat it purely as a pressure instrument. For this reason it is best to do away with the zero adjustment for all test purposes, and lock the instrument so that the zero point on the height scale corresponds to the standard atmospheric pressure of 29.9 ins., or 760 mm. of mercury. Every other height then corresponds to a definite pressure; for instance, the locked aneroid reads 5,000 feet when the atmospheric pressure is 24.88 ins., and 10,000 feet when it is 20.70 ins., and so on.

If the temperature is noted at the same time as the aneroid reading, we then know both the atmospheric pressure and temperature at the point, and hence the density can be calculated, or, more conveniently, read off curves drawn for the purpose. The observations necessary (after noting the gross aeroplane weight, and nett or useful weight carried) are, therefore (i) aneroid height every 1,000 feet; (ii) time which has elapsed from the start of the climb; and (iii) temperature. To these should be added also (iv) the air speed, and (v) engine revolutions at frequent intervals. Petrol consumption is also noted.

The observed times are then plotted on squared paper against the aneroid heights and a curve drawn through them. From this curve the rate of climb at any part (also in aneroid feet) can be obtained by measuring the tangent to the curve at the point. This is done for every 1,000 feet by aneroid.

The true rate of climb is then obtained by multiplying the aneroid rate by the correction factor corresponding to the observed temperature. These true rates are then plotted afresh against standard heights, and from this curve we can obtain the rates of climb corresponding to the standard heights 1,000, 2,000, 3,000, etc. Knowing the change of rate of climb with height, the time to any required height is best obtained by graphical integration. The following table gives the results of an actual test:—

TABLE IV.

Machine .... Engine .... 27/12/16.

Height in Aneroid feet.	Observed temp.	Percentage of standard density.	Observed time.	Rate of climb in Aneroid ft.	Real rate of climb (corrected for temp.)	From Curve. Standard height.	From Curve. % of standard density.	From Curve. Time.	From Curve. Rate of climb.
0	36° Fahr.		0.0						
1,000	38° „	101.0	1.0	835	814	1,000	99.40	1.20	775
2,000	38° „	97.2	2.10	735	718	2,000	96.30	2.56	685
3,000	36° „	94.0	3.70	640	622	3,000	93.26	4.11	610
4,000	36° „	90.7	5.40	560	544	4,000	90.25	5.85	545
5,000	36° „	87.4	7.25	510	495	5,000	87.35	7.80	490
6,000	33° „	84.7	9.40	450	435	6,000	84.50	9.96	435
7.000	30° „	82.1	11.90	405	389	7,000	81.80	12.40	385
8,000	26° „	79.9	14.25	365	347	8,000	79.16	15.14	345
9,000	22° „	77.6	17.00	330	312	9,000	76.55	18.20	310
10,000	23° „	74.7	20.25	310	294	10,000	74.00	21.61	280
11,000	21° „	72.2	23.60	280	264	11,000	71.70	25.41	245
12,000	20° „	69.8	27.40	230	216	12,000	69.50	29.81	210
13,000	17° „	67.7	31.90	195	182	13,000	67.32	35.13	170
14,000	12° „	65.9	37.90	150	139	14,000	65.17	41.88	130
15,000	8° „	64.1	45.25	110	101	14,500	64.11	46.23	105

At least two climbing tests of every new machine are carried out up to 16,000 feet or over by aneroid. If time permits three or more tests are made. The final results given are the average of the tests, and represent as closely as possible the performance on a standard day, with temperature effects, up and down currents, and other errors eliminated.

If we produce the rate of climb curve upwards it cuts the height axis at a point at which the rate of climb would be zero, and, therefore, the limit of climb reached. This is the "ceiling" of the machine.

Speeds.

His 16,000 feet, or whatever it is, reached, the flier's next duty is to measure the speed flying level by air speed indicator at regular intervals of height (generally every 2,000 feet) from the highest point downwards. To do this he requires a sensitive instrument which will tell him when he is flying level. The aneroid is quite useless for this purpose, and a "statoscope" is used. The principle of this instrument is really the same as that of a climbmeter.

It consists of a thermos flask connected to a small glass gauge, slightly curved, but placed about horizontally. In this gauge is a small drop of liquid, and at either end are two glass traps, which prevent the liquid from escaping either into the outside air or into the thermos flask. As the machine ascends and the atmospheric pressure being smaller, and the pressure in the flask being higher than the external pressure, the liquid is pushed up to the right-hand trap, where it breaks, allowing the air to escape. On descending, the reverse happens; the liquid travels to the left, breaks, and air enters the flask. When flying truly level the drop remains stationary, moving neither up nor down. The instrument is made by the British Wright Co.

The flier or the observer notes the maximum speed by the air speed indicator, i.e., the speed at full engine throttle. At one or more heights also, he observes the speeds at various positions of the throttle down to the minimum speed which will keep the machine flying at the height in question. The petrol consumption and the engine revolutions are noted at the same time, as well, of course, as the aneroid height and temperature.

Accurate observation of speeds needs very careful flying—in fact, much more so than in climbing tests. If the air is at all bumpy, observations are necessarily subject to much greater error, since the machine is always accelerating and decelerating.

True Level Flying.

The best way to carry out the test seems to be as follows. The machine is flown first just down hill and then just up hill, and the air speeds noted. This will give a small range between which the real level speed must lie.

The flier must then keep the speed as steadily as possible on a reading midway between these limits, and watch the statoscope with his other eye.

If it shows steady movement, one way or the other, the air speed must be altered accordingly by 1 m.p.h. In this way it is always possible at heights where the air is steady to obtain the reading correct, at any rate, to 1 m.p.h., even with light machines, provided always sufficient patience is exercised. The r.p.m. at this speed are then noted.

One difficulty, however, cannot be avoided. If at any height there is a steady up or down air current, then, though the air may appear calm, i.e., there may be no "bumps," the air speed indicator reading may be wrong, since to keep the machine level in an up current it is necessary to fly slightly down hill relatively to the air. Such unavoidable errors are, however, eliminated to a large extent by the method of taking speeds every 2,000 feet, and finally averaging the results.

Air Speed Indicator Errors.

We must now consider how the true speed of the aeroplane is deduced from the reading of the air speed indicator. It is well known that an air speed indicator reads too low at great heights—for example, if it reads 70 m.p.h. at 8,000 feet the real speed of the machine through the air is nearer 80 m.p.h.

The reason for this is that the indicator, like the aneroid, is only a pressure gauge—a sensitive pressure gauge, in fact, which registers the difference of pressure between the air in a tube with its open end pointing forward along the lines of flight of the machine, and the real pressure (the static pressure) of the external air.

This difference of pressure is as nearly as we can judge by experiment $= \frac{1}{2}pV^2$ (where p is the density of the air and V the speed of the machine), provided that the open end of the tube is well clear of wings, struts, fuselage, etc., and so is not affected by eddies and other disturbances.

Now, assuming this law, air speed indicators are graduated to read correctly, as I have said above, at a density of 1.221 kgm. per cubic metre, which we have taken as our standard density and called "unity." It corresponds on an average to a height of about 800 feet above sea level.

Then suppose the real air speed of an aeroplane at a height of "h" feet is V m.p.h., and the indicated air speed is 70 m.p.h., this means that the excess pressure in the tube due to the speed is proportional to 1×70^2,

$$\text{or } \rho \times V^2 = 1 = 70^2.$$

where p is the density at the height in question, expressed as a fraction of the standard density.

To correct the observed speed, we therefore divide the reading by the square root of the density. Thus, observation of the maxi-

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mum speed of an aeroplane at a height of 8,000 feet by the locked aneroid gave 80 m.p.h. on the indicator, the temperature being 31 deg. Fahr. From the curve we find that the density corresponding to 8,000 feet and 31 deg. is 0.85 of standard density. The corrected air speed is therefore :—

$$= \frac{80}{\sqrt{.85}} = 86.7 \text{ M.P.H.}$$

This "corrected" air speed will only be true if the above law holds, that is to say, if there are no disturbances due to the pressure head being in close proximity to struts or wings. It is always necessary to find out the magnitude of this possible error, that is, to calculate the air speed meter, and the only way to do this is to measure a real air speed at some reasonable altitude for easy observation of the aeroplane by actual timed observations from the ground, and from these timed results check those deduced from the air speed indicator readings.

This calibration is the most important and difficult test of all, since on the accuracy of the results depends the accuracy of all the other speed measurements. It can either be done by speed trials over a speed course close to the ground, or when the aeroplane is flying at a considerable height above the ground. In the Testing Squadron we have always attached much more importance to the latter method, mainly because the conditions approximate more to the conditions of the ordinary air speed measurements at different heights, and because the weather conditions are much steadier, and the flier can devote more attention to flying the machine at a constant air speed than he can when very close to the ground.

VISUAL SPEED TESTS.

One method is to use two camera obscuras, one of which points vertically upwards, and the other is set up sloping towards the vertical camera. At one important testing centre the cameras are a mile apart, and the angle of the sloping camera is 45 deg. By this arrangement, if an aeroplane is directly over the vertical camera, it will be seen in the field of the sloping camera if its height is anywhere between 1,500 and 15,000 feet, although at very great heights it would be too indistinct for measurements except on a very clear day. The height the tests are usually carried out is 4,000 feet to 6,000 feet.

The aeroplane is flown as nearly as possible directly over the vertical camera, and in a direction approximately at right angles to the line joining the two cameras. The pilot flies in as straight a line and at as constant an airspeed as he can. Observers in the two cameras dot in the position of the aeroplane every second. A line is drawn on the tables of each camera pointing directly towards the other camera, so that if the image of the aeroplane is seen to cross the lines in the one camera it crosses the line in the other simultaneously.

From these observations it is possible to calculate the height of the aeroplane with considerable accuracy; the error can be brought down to less than 1 part in a 1,000 with care. Knowing the height, we can then calculate the speed over the ground of the aeroplane by measuring the average distance on the paper passed over per second by the image in the vertical camera. If x inches is this distance, and f the focal length of the lens, the ground speed is $x \times h/f$ feet per second.

It is necessary to know also the speed and direction of the wind at the height of the test. For this purpose the pilot or his observer fires a smoke puff slightly upwards when over the cameras, and the observer in the vertical camera dots in its trail every second. The height of the smoke puff is assumed to be the same as that of the aeroplane—it probably does not differ from this enough to introduce any appreciable error in the results.

[At this point two representatives of the Press left the hall, apparently disappointed at finding that a lecture on testing aeroplanes did not include grisly stories of breakages in the air, and hair's-breadth escapes from a ghastly death by fire in the air. —Ed.]

The tests are done in any direction relative to the wind, and generally at three air speeds, four runs being made at each air speed.

The advantages of this method are :—

(1) Being well above the earth the pilot can devote his whole attention to the test.

(2) Within reasonable limits any height can be chosen, so that it is generally possible to find a height at which the wind is steady.

(3) It does not matter if the pilot does not fly along a level path so long as he does so approximately. What is more important is that he should fly at a constant air speed.

(4) It is not necessary that there should be any communication between the two cameras, although it is convenient. The two tracks are made quite independently, and synchronised afterwards from the knowledge that the image must have passed over the centre line simultaneously in the two cameras.

The main disadvantage is that somewhat elaborate apparatus is necessary, but this is of not much importance in a permanent testing station.

There are often periods in war time, however, when an aeroplane has to be tested quickly, and low cloud layers and other causes prevent the camera test from being carried out. It is then necessary to rely on measurements of speeds near the ground for the calibration of the air speed indicator. In this method the aeroplane is flown about 10 feet off the ground, and is timed over a measured run.

There are two observers, one at each end of the course; when the aeroplane passes the starting point the observer sends a signal and starts his stop-watch simultaneously; the second observer starts his stop-watch directly he hears the signal, and in his turn sends a signal and stops his watch when the aeroplane passes the finishing point.

By this double timing, errors due to the so-called "reaction time" of the observers are practically eliminated, for the observer at the end of the course tends to start his watch late, while the first observer stops his late. The mean of the two observations gives the real time. Four runs, two each up and down the course, are done at each air speed, the pilot or his observer noting carefully the average air speed during the run.

Observations of the atmospheric pressure and temperature from which the density can be obtained are also taken. The average strength and direction of the wind during each trial are noted from a small direct reading (or recording) anemometer and the speed corrected in the same way as in the camera tests.

If there is a strong cross wind the aeroplane may have to be pointed at a considerable angle to the course, and this makes the test a very difficult one to carry out well. Generally speaking, it is only reliable when the wind is quite light, not more, at any rate, than 10 m.p.h. Even this is too strong if it is a cross wind.

A further difficulty is that at high speeds, over 100 m.p.h., an aeroplane may take quite a considerable time to accelerate up to a steady speed, and so it must fly level for a long distance each end before reaching the actual course. At the testing station previously alluded to, the course is a mile long, and there is a clear half-mile or more at each end, but it is doubtful whether even this distance is enough for the machine to attain steady speed before the starting point.

Finally, the flier of a single-seater is generally too busy watching the ground to do more than glance at his air speed indicator more than a few times during the run. Doubtless it would be better in such a case to use some form of recording air speed instrument, although then other difficulties would arise.

Having got the true air speed from camera or speed course tests, and knowing the density at the height at which the test was carried out, we obtain what the air speed indicator should have read by multiplying the measured air speed by the square root of the density. By comparing this with the actual reading of the indicator we obtain the necessary correction. The whole procedure may be shown best by a table (V) giving part of the results of a camera test made at the beginning of the year.

A summary of the complete speed tests may now be given. Firstly, the air speed and engine revolutions are noted flying level at full throttle every 2,000 feet approximately by aneroid. From the aneroid reading and temperature observation at each height the density is obtained. The reading of the air speed indicator is then first corrected for instrumental errors by adding or subtracting the correction found by calibration tests over the cameras or speed course.

This number is then again corrected for height by dividing by the square root of the density. The result should give the true air speed, subject, of course, to errors of observation.

The numbers so obtained are plotted against the "standard" heights—i.e., the average height in feet corresponding to the density during the test. A smooth curve is then drawn through

TABLE V.

Calibration Test of Air Speed Indicator No. ...... On ...... Machine. 24/12/16.

Run No.	Measured ground speed.	Measured wind speed and direction.	Corrected true (= V) air speed.	Observed Aneroid Height.	Observed temp.	Density ($=p$) referred to standard density.	Observed air speed.	$V \times \sqrt{\rho}$	Correction necessary.
1	59.1 m.p.h.	31.0 m.p.h. 161.5	89.2	5,100	31	0.879	80.0	83.6	× 3.6
2	123.4 ,,	28.6 ,, 5.5	93.7	5,100	31	0.879	85.0	87.8	× 2.8
3	62.0 ,,	32.3 ,, 168.5	93.8	5,050	31	0.881	85.0	88.1	× 3.1
4	124.7 ,,	32.3 ,, 21.0	95.6	5,000	31	0.882	88.0	88.8	× 2.8
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TABLE VI.

27/12/16.

AIR SPEEDS AT HEIGHTS.

Aneroid height.	Temperature observed.	Standard density.	Corresponding standard height.	Observed air speed.	For calibration tests.	Corr. for density.	Observed R.P.M.
3,000	39° F.	.935	2,900	95 m.p.h.	98	101½	1,280
5,000	35°	.875	4,900	93 ,,	96	102½	1,280
7,000	30°	.821	6,900	88 ,,	91	100½	1,240
9,200	24°	.767	9,000	81 ,,	84	96	1,220
10,800	19°	.731	10,400	80 ,,	83	97	1,220
12,800	17°	.682	12,600	72 ,,	76	92	1.200
13,800	12°	.664	13,400	68 ,,	72	88½	1,180
15,200	8°	.636	14,800	65 ,,	69	86½	1,160

FINAL RESULTS FROM CURVE.

Standard height.	Air speed.	R.P.M.
3,000	103.0 m.p.h.	1.290
6,500	100.5 ,,	1,250
10,000	96.5 ,,	1,215
13,000	94.5 ,,	1,180
15,000	86.0 ,,	1,160

the points and the air speeds at standard heights of 3,000, 6,500, 10,000, 13,000, and 16,500 read off the curve. These heights are chosen because they correspond closely with 1, 2, 3, etc., kilometres.

The indicated engine revolutions are also plotted against the standard heights, because these observations form a check on the reliability of the results; also, the ratio of speed to engine revolutions at different heights may give valuable information with regard to the propeller.

Table VI gives complete results of one of our tests of air speed at heights. The table refers to the same machine as Table V, which gives the results of calibration tests of the air speed indicator.

In a brief paper it is impossible to do more than try to explain the more important of the "performance" tests of aeroplanes, considered solely as flying machines.

For military purposes a number of tests are necessary, some of which cannot be reduced to figures. Nor can it be supposed for an instant that the methods outlined here are final; aeroplane testing, like all other work connected with aeroplanes, is only in its infancy; and as time goes on, and knowledge accumulates, better methods and instruments will be evolved.

There are some who lay considerable emphasis on the necessity of every test instrument being self-recording, and although this scheme appears at first sight Utopian and would relieve the pilot of a single-seater of considerable trouble, there are many objections to it when considered in detail, not the least of which is the difficulty of getting new and elaborate instruments made at a time when all manufacturers are fully engaged on other important work.

When an observer can be taken, I would personally place much more reliance on direct observations at the present time, and one great advantage of direct observation is that the results are there, and no time is lost through the failure of a recording instrument to record, a circumstance which is not unknown in practice. So far as we use recording instruments, we use them only as a check on direct observations, although we shall probably soon adopt recording air speed indicators for the calibration tests.

THE PILOT'S VALUE.

But whether recording or direct reading instruments are used, it is, as I said before, the flier on whom the accuracy of the tests depends. I feel that too great stress cannot be laid on this; he is the man who does most of the experiments, and, like all experimenters in every branch of science, he requires training and a great deal of practice. Although the methods themselves may be greatly changed, this much may perhaps be claimed, that the general principles on which they are founded are sound, and will only be altered in detail.

The importance of the work can hardly be exaggerated; model experiments are notoriously subject to scale and other corrections, which, if not carefully scrutinised, may be very misleading, and it is only by accurate full scale work that we can hope to maintain a steady improvement in the efficiency of aeroplanes.

THE DISCUSSION.

Captain Mayo, also of the Test Squadron, who was invited to speak, said that he had come to listen, and would rather not make any observations.

Captain Farren, R.A.F., agreed with the lecturer in the main. He thought it possible to fly perfectly level with the help of an aneroid, and knew pilots who could fly for ten minutes at a time without any appreciable deviation. He stated that the instrument for indicating rate of climb which Captain Tizard ascribed to the R.A.F. was really attributable to Captains Dobson and Tizard, and was commonly known as the "coffee-ometer." The R.F.A. now used a statoscope which is less bulky and heavy than that used by the Test Squadron. He personally had discovered an old statoscope at the R.A.F. for measuring climb which had been made and used by the Germans years before in ballooning. The liquid in statoscopes is affected by acceleration, and so they are misleading unless used with care.

He agreed with Captain Tizard that first-class testing must be done by men accustomed to scientific tests of other kinds. Pilots used to say that one man could make a machine climb very much better than another. He considered there was no magic about climbing, but that care was wanted rather than extraordinary skill. Pilots were not always in sympathy with the nature of the testing experiments, and it was difficult to persuade a pilot to go to 17,000 ft. when he knew one wanted a 16,000 ft. test. The pilot believed his aneroid and stopped at 16,000 ft. The best way was to tell them to go to 20,000 ft., and then one got what one wanted.

Captain Grinstead said it seemed quite clear that any further improvements which could be got rested with the improvements in instruments. The lecturer gave the aneroid too good a character. He would like to know if Captain Tizard had had difficulty in obtaining aneroids in which lag did not affect results. He pointed out that testing instruments are practically limited to climb and speed. He thought that we should need instruments to show how long a machine took to turn onto its back, or to move through a given angle.

Major Pylon (?) expressed his admiration for the work of Captain Tizard. Looking at it as a scientific man, he was struck by the system and the accuracy aimed at. Standardisation on a basis of air density was of great importance to the designer and manufacturer. He hoped that the result of these tests might be analysed and possibly communicated to manufacturers and designers. He was sure they would be of the very greatest value, because even a small variation in performance might give a clue to a new line of development and produce extremely important results. Thermometers were old friends of his, and he was glad to see that temperature was measured directly. If calculated only, the results were bound to be erroneous. He had never met a thermometer without lag, and he would like to know what results were found. Recording instruments were open to much improvement, but should be valuable, as it was asking a lot from a pilot to expect him to fly, and read a thermometer, an aneroid, a speed indicator, a statoscope, and a revolution indicator all at once.

Sq. Comm. H. Busteed, R.N., regretted that Naval testing was rather behind. It would be a good thing if they all got quickly into line instead of one party using one density of atmosphere and the other different ones. He also said that for getting work done he preferred observation from the ground to the use of recording instruments. In his experience it was found that after waiting for weeks for a suitable day the mechanism of the recording instruments was almost sure to go wrong as soon as fine weather arrived.

Lieut. Archibald R. Low, R.N.V.R., who was next to Comm. Busteed, was sorry he was seated near so strong a man because he differed from him very seriously He thanked Captain Tizard for the educative influence which radiated from him. He thought that this meeting would raise the standard of test flying. He was not sure that long practice was essential to successful test flying. The latest pilot at his station had produced straight off an absolutely perfect exponential curve, despite the failure of similar efforts by other pilots for months. He believed very strongly in recording instruments, and considered that they saved much waste of time, and although he confessed to being a skilful cook of figures, he certainly thought that recording instruments lent themselves less readily to the practice of reconciling readings to expected results. As regards the reading of several instruments in the air, he had found that the average aeroplane had a period of oscillation of less than a minute, and that it was humanly impossible to read a number of instruments during all phases of this period, whereas the recording instrument took the various readings simultaneously.

Mr. Bertram Cooper inquired regarding lag in climb-meters.

Mr. Griffith Brewer, on being called upon, remarked that he had come to learn, not to instruct.

Lieut. Miller, R.N V.R., regretted that the standard atmosphere adopted by the lecturer was purely empirical, and thought that it should be purely mathematical. He objected to the term "air speed", for no one spoke of the "water speed" of a boat. The term should be "true speed" or simply "speed."

Dr. Stanton thought that the rate of climb was governed

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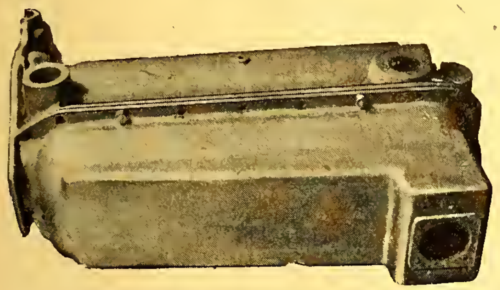

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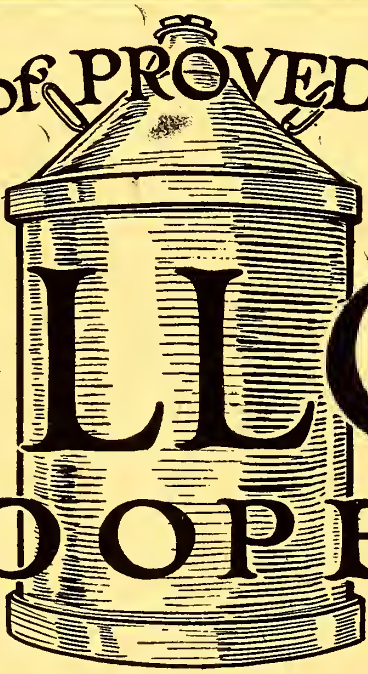

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largely by engine power and propeller performance, and varied accordingly.

An unnamed member asked whether gyroscopic control had been tried to obtain perfectly steady flight for testing purposes. He wanted to know with regard to standing atmosphere whether the air implied was pure and dry, or whether subject to moisture, and, if so, to what extent. He considered that sea level was the best standard to adopt. He would be interested to know to what extent and in what way the statoscope was shielded from wind and draught in an aeroplane, and suggested there was more lag in recording instruments, owing to the recording mechanism.

Mr. Bairstow, of the National Physical Laboratory, defended the policy of that institution with regard to tests on models, declared that there was no reason why models should not give equally conclusive results with full-sized experiments, and said that the most successful and scientific aeroplanes had been designed from data obtained from model experiments. He admitted errors, but claimed that none exceeded 10 per cent. He had yet to find serious discrepancies between the results of experiments with models and the tests of full-size machines.

Captain Tizard, in reply, explained that the aneroid in an aeroplane is subject to considerable vibration, and has, therefore, less lag than was sometimes supposed. The Test Squadron calibrated their aneroids under pressure by the use of a pump, and diminished the pressure at about the same rate as that encountered in a climbing aeroplane. He preferred the aneroid to the recording barometer, because of the absence of the time lag in the needle. He did not find the lag in the thermometer appreciable, but the lag in the rate of climb indicator was more serious. This, however, could be remedied by a process of descending in two-thousand foot stages, and flying horizontally for some distance to allow the instrument to steady itself. One big firm of instrument makers hoped to overcome lag altogether.

He did not think that test pilots need be trained scientists, but he believed that people who were conducting tests should fly themselves, in order that they might appreciate the difficulties experienced by pilots.

He had never tried gyroscopic controls.

He gave examples on the screen of graphs from French recording instruments to demonstrate their irregularity and the difficulty of getting useful results from machines in which such instruments were used where the pilot had nothing to assist him to fly evenly.

He was not sneering at model experiments, and he quite realised the brilliant work done by the N.P.L., but, although he agreed with Mr. Bairstow that results of value were obtained from model experiments in many instances, results had been disappointing. In the case of one particular machine, whose performance had been predicted from model data by the N.P.L., they had only allowed it a climb of 100 feet per minute, whereas the machine, when built, had achieved 260 feet a minute.

So much depended on engines and propellers that errors must occur in estimates based on models. Petrol was used up in climbing, and so affected results. The real value of the work of the Test Squadron depended upon the pilots.

General Ruck moved a vote of thanks to the lecturer, which was most heartily endorsed by the audience, and so closed a highly instructive and enjoyable evening.

DUAL CONTROL.

The address given before the Aeronautical Society of Great Britain by Brigadier-General W. S. Brancker on Jan. 24th, dealing with "The Teaching of Flying," evoked a good deal of discussion on the use of dual control on tuition machines. A consideration of the whole subject of dual control and its relation to duplicated control, therefore, may be of supplementary interest.

There are two aspects from which the subject may be viewed, namely, the use of dual control apparatus as

An aid to tuition.
An insurance against the pilot's death in war.

To take one aspect at a time. Admitting that the presence of an instructor on a school machine is desirable, there are three alternatives to the manner in which he may go about his work.

In the first place, he may sit in the passenger seat and bawl instructions into the pupil's ear, in the hope that the latter may hear and respond.

Or the passenger seat may be disposed in such a manner that the instructor may be able to reach a sufficient proportion of the controls to correct the pupil's more consequential mistakes—as in the box-kite.

Or the machine may be fitted with a duplicate set of controls in the passenger seat for the instructor to operate on his own account—as is the modern system.

The first method named was never popular, as the novice could always be relied upon to do the wrong thing at the wrong time, and would be sure to mistake right for left, with the result that the whole outfit generally came to grief.

The second method found favour to a very great extent during peace time. Instructor and pupil sat one behind the other alternately, working the same control levers, the idea being that the instructor had both moral and physical ascendancy over the pupil, but this was not always the case, and the average "professor" of flying was haunted day and night by horrid visions of a "*chute mortelle*" in a machine with a stage-struck novice whose terrified muscles would not relinquish the errant "joy-stick." Nevertheless, this method is still quite popular at some schools.

The other alternative of fitting up the teacher with a private set of controls also came into operation, but the dissociation of the teacher and learner made it seem more difficult for the past-master to take full control at the critical moment.

The position was almost as bad as in the case of certain ancient tandem bicycles, where the rear handle-bar was linked up to the steering head as well as the front bar, with the result that the crew used to disagree on the subject of control.

The obvious remedy was to arrange a cut-out system by which the pilot could hand over the control to the pupil by mechanical means, in the hopes of regaining control, when necessary, by cutting out the pupil by the same mechanism; but this system involves the possibility of the apparatus refusing to relegate control to the instructor at some particularly excruciating moment of anguish.

The simplest method of mastering this risk would be to couple up all the control wires solid to the instructor's lever and rudder bar, and to link up the pupil's bar and lever by the use of a suitable friction clutch which only the instructor could operate. Then the teacher could give his ward (*pro tem.*) full control, simply by letting everything go, and in the event of the clutches failing to disengage, he might still outmaster the pupil by brute force.

The Active Service Machine.

The question of dual control is even more important when considered from the military point of view. In many instances the safe return of an aeroplane is of even greater moment than the human life involved in an accident, so that every improvement that can be incorporated in a war machine which will be an additional insurance against non-return is well worth trying out.

Many reconnaissance aeroplanes on active service are now fitted with dual control. The wires from rudder, elevator, and ailerons are usually coupled up with the rudder-bar and control lever in the pilot's cockpit, and these in turn are linked up permanently with a rudder-bar and control lever in the passenger's cockpit. The passenger's control lever is often detachable, so that it can be stowed out of the way when not likely to be required.

The reason why a cut-out device has not been favoured is because of the danger of the passive section of the control gear refusing to link up should the passenger have to take charge in the event of the pilot being knocked out.

On the other hand, the present arrangement presents an almost equally potent risk, as, in the event of the pilot being killed, he is just as likely as not to fall over the control lever or else to slide down and jam his foot in the rudder bar, and so immovably fix the passenger's controls.

The solution of the difficulty seems to be to connect up one set of the duplicated control cables, which are now almost invariably employed, with each set of control levers, and to link the two sets of controls in such a manner that they can be cut in or out by either pilot or passenger.

In this manner both pilot and passenger would have a set of control levers connected directly with rudder, elevator, etc., which would be permanently in commission. The difference would be that in time of emergency the passenger could put the pilot's control gear out of action, and fly the machine unhindered.

The details of the mechanism required are such as any capable aircraft designer should be able to work out. All that remains to be decided is whether the few pounds extra weight involved can be spared from the military load.

In the event of a control wire breaking which led to the pilot's control set, he could of course carry on by engaging the passenger's control set, which would assist to remove still another danger.—W. L. W.

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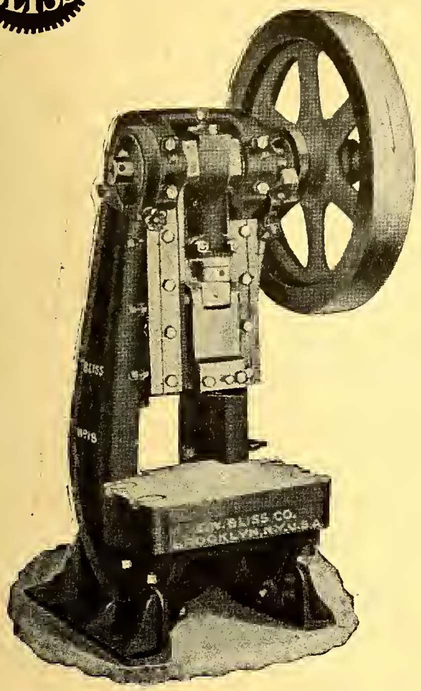

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MARKET REPORTS.

March 17th, 1917.

Prices Given are for Quantities on Usual Terms.

For the various Aircraft Materials affected by the materials referred to below, the reader is referred to last week's report.

COPPER.—Prices remain unchanged, and the general situation here is the same. The available stocks are being strictly controlled by the authorities.

Under a Regulation dated Feb. 28th, 1917, the Minister of Munitions takes possession of all yellow brass scrap, swarf, turnings and borings from the manufacture of war materials, and any person selling, removing, or retaining it without the consent of the Minister of Munitions, or dealing with it in any way contrary to conditions shown on any licence or permit, he will be guilty of an offence under the Defence of the Realm Act.

A monthly report must be given of all brass scrap and swarf made. For further particulars, apply to the Director of Materials (A.M.2 5).

The close control of copper supplies, and the various economies now being effected, will release larger supplies for national requirements.

For guidance, a comparison of prices is given below:—

Standard Cash Terms.—Prices to-day, £139. A week ago, £136. Two years ago, £63 12s. Last year's highest, £153.

Current Prices.—Copper Sheets, £174. Copper Tube S.D., 20¾d. Brass Tube, 17½d. Brass Sheet, 16⅜d.

STEEL.—The position is serious, and it is difficult to understand why semi-skilled and unskilled men are being called away from the steel works. The substitutes provided are an apparent failure. There appears to have been a total cessation of all kinds of steel deliveries from U.S.A.

Swedish iron and steel prices are very high, and very little is coming here now, although some of our principal users have large stocks in reserve.

Prices are about the same as last week (for finished steel), and there does not appear to be any prospect of the situation becoming easier—in fact, the tendency is upward.

ALUMINIUM.—This material, like copper, is being very closely controlled, and the new regulations governing scrap will affect all aircraft contractors and sub-contractors.

From March all existing permits for sale, purchase, or remelting of aluminium scrap or swarf are cancelled.

Briefly, the regulations are as follows; full particulars can be obtained from the Director of Materials, A.M. (2) H, Hotel Victoria, Northumberland Avenue, W.C

(a) No existing aluminium scrap and swarf may be used for any purpose excepting at the works where the same has been produced and for contracts for which aluminium has been released by the Director of Materials, and as portion of the amount so released.

(b) All existing aluminium scrap and swarf not required for use as stated in (a) shall be sold and sent within three weeks from the 1st day of March, 1917, to the refiner, or one of the refiners, as the case may be, nominated by the Ministry of Munitions for the district where such scrap and swarf is situated.

(c) When aluminium scrap and swarf is produced hereafter it must only be used as stated in Clause (a), or if not required for use, must be sold, and sent to one of the refiners referred to in Clause (b).

TIMBER.—Prices are on the up-grade; this applies particularly to mahogany and walnut. The demand for mahogany can be judged by the prices commanded for Honduras wood at a sale on Feb. 28th. This sale was watched with much interest by the timber trade. Although the timber was damaged by fire, extraordinary prices were obtained. The maximum reached was 2s. 3d. per foot for some Honduras. Readers will remember I pointed out last week that the demand for mahogany was increasing.

Average Current Price.—Silver Spruce, 13s. to 14s. c. ft. English Ash, 12s. to 13s. c. ft. Walnut, 2s. 3d. super. Mahogany, 1s. 9d. in Log; Plank, 1s. 10½d. to 2s, super,

Prices are for quantities, delivery, and selection.

FABRIC.—The position is very uncertain. The War Office have not yet fixed the official prices, and manufacturers do not appear to be very favourably disposed towards the control of prices and supplies being in the hands of the War Office authorities.

Everything indicates an advance in prices of tapes, webbings, etc.

A SUCCESSFUL AERIAL TORPEDO.

The United States has now in its possession an aerial torpedo destined to mark a great advance in modern frightfulness. The chief point about the new engine of destruction is that it explodes at a given height above the ground, permitting the force to travel horizontally. All other attempts at firing shells at predetermined heights have been failures. The inventor of the new shell is Lester Barlow, a young man, who perfected his invention under the auspices of the United States Government, and served as chief engineer under General Villa, when Villa and Carranza fought side by side to crush the government then existing in Mexico.

Barlow's torpedo was tested by the United States Government at Mineola, L. I, early in September of last year. The report of the Army Ordnance Board signed by Lieut.-Col. C. H. L. Ruggles, Ordnance Department, says: "The Barlow aerial torpedo is satisfactory. The action certain, the flight true, and the safety devices satisfactory."

The tests of Sept. 6th and 7th last were witnessed by Lieut. T. S. Wilkinson, U.S.N. Those of the 6th, 7th, and 8th by Capt. E. J. Ragsdale, Ordnance Department, and all by Lieut.-Col. G. G. Gatley, Ordnance Department.

The torpedo was dropped from 2,000, 3,000 4,000, 5,000, 6,000 and 7,000 ft. In two of the tests light charges of high explosives were used—full charges would have endangered the community. The light explosive charges shook houses three and four miles away.

The new torpedo is 7½ ft. long. Its weight is 100 lbs. It has a streamline form to eliminate air resistance, thus ensuring the greatest possible speed between aircraft and target.

The tests at Mineola showed that the Barlow torpedo will explode accurately to the inch of the point it is set to detonate. The aviator has nothing to do with the timing of the shell. It is automatically timed to explode at a given point, no matter from what altitude it is dropped.

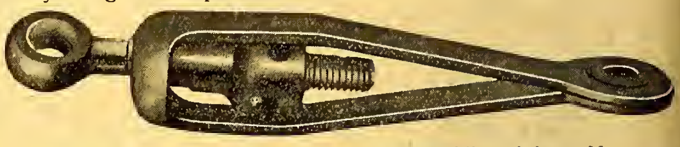
The torpedo is carried attached horizontally beneath the aeroplane in traps, and is released by the moving of a small lever when the cross-wires in sighting apparatus designate the proper position. The torpedo sets itself after it has fallen 300 ft. Before being released it is absolutely non-explosive. In addition to the charge of high explosives it is capable of carrying 1,000 cubic feet of poisonous gases.

A WAR LOAN CONTRIBUTION.

It is interesting to note that the individual and collective contributions to the War Loan by the directors, staff, and employees of Mann, Egerton and Co., Ltd., of Norwich, Ipswich, Bury St. Edmunds, and London, amounted to £30,000 (new money).

THE AVRO TURNBUCKLE.

Mr. A. V. Roe has had to pay the penalty of being a pioneer on a good many occasions. In the early days of aviation everybody kicked against the Avro type of machine; they said it was all right having a propeller in front in the case of a monoplane, but it could not be done in the case of a biplane, and, therefore, general opinion was very slow in accepting the Avro type as really being an aeroplane.



It is surprising what an effect war has on public opinion. Now, when Mr. A. V. Roe introduces a new idea, it is accepted far more readily. When he broke away from standard ideas in turnbuckles and introduced the Avro type, general opinion was against it at first, but the war has had its effect, and the Avro Turnbuckle is now accepted, not as a makeshift or as a poor relation, but absolutely the proper thing in turnbuckles, so much so that the old type of barrel strainer is in danger of being forced into a back seat.

New Patents.

This list is specially compiled for The Aeroplane by Rayner and Co., Registered Patent Agents, 5, Chancery Lane, E.C.

Latest Patent Applications.

2849. W. E. Back. Aerial machines. 27/2/17.

2930. W. C. Batten. Aeroplane steering and control lever. 28/2/17.

3161. S. B. Bignold. Aircraft and motor vehicles. 3/3/17.

3119. W. W. Hewitt. Rigid airships and method of constructing them. 2/3/17.

2987. F. B. Dehn. (Greene Aeronautic Co.) Aeroplane. 28/2/17.

Latest Published Abstract.

15,786. Flying-boats. Curtiss Motor Co., Hammondsport, New York.

A flying-boat comprises a main flotation body having a single hydroplane under surface which extends out on both sides beyond the body in the form of buoyant fins. The body and fins are of streamline form longitudinally, and the under surface is V-shaped with concave sides at the front, the concavity decreasing towards the rear. The boat body which is stepped includes a cabin and bouyant water-tight compartments; in general cross-section it is elliptical, flattened at the top in front, and formed with a flat gun platform in front of the cabin windows. The tail portion has a flattened under surface and gradually decreases in width to a straight vertical rudder post.

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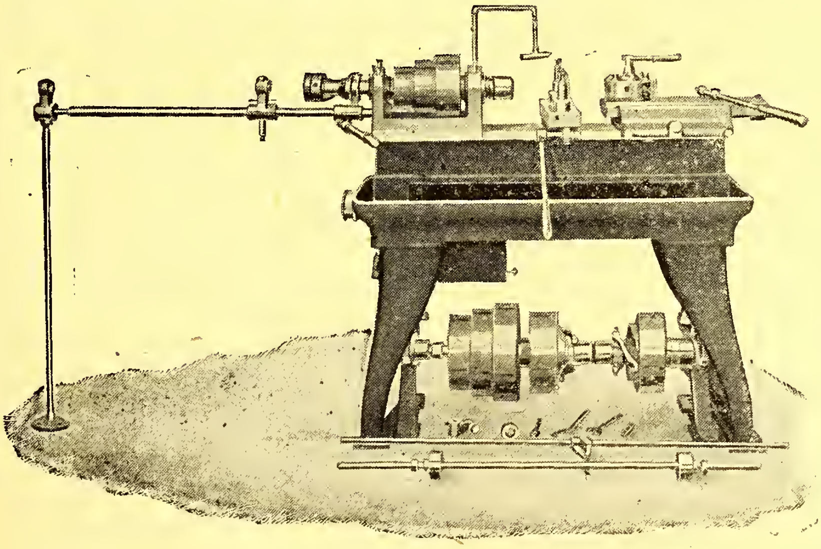

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Bleriot & Spad Aircraft Works, Addlestone, Surrey
Boulton & Paul, Ltd., Rose Lane Works, Norwich
British & Colonial Aeroplane Co., Ltd. (The Bristol Co.), Filton, Bristol.
British Caudron Co., Ltd., Broadway, Cricklewood, N.
Canute Airplane Co., Royal Pier Gate, Southampton.
Curtiss Aeroplane Co., L. J. Seely, Clun House, Surrey St., Strand, W.C.
Davidson Aviation Co., Ltd., Hammersmith, W.
Eastbourne Aviation Co., Ltd., Eastbourne
Grahame-White Aviation Co., Ltd., London Aerodrome
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Standard Aircraft Manufacturing Co., Effingham House, Arundel St., W.
Supermarine Aviation Co., Ltd., Southampton
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Robinson & Cleaver, Ltd., Regent St., London, W.

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The Osborne Aircraft Co., Ltd., Whin Hill, Greenock, Scotland
Ward, Fredk., 6, 7, & 8, Allsop St., Upper Baker St., W.
Worms Aircraft Construction Co., Twickenham

CORDS, TAPES AND THREADS—
MacLennan, J., & Co., 30, Newgate St., E.C., and at Glasgow

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British Cellulose Co., 8, Waterloo Place, S.W.
Cellon, Ltd., Broad St., House, New Broad St.
Emaillite, General Aeronautical Co., Ltd., 30, Regent St., S.W.

ELECTRICAL ACCESSORIES—
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Beatty School of Flying, Ltd., London Aerodrome
Beardmore Aero Eng., Ltd., 112, Great Portland Street
Dudbridge Iron Works, Ltd. (Salmson), 87 Victoria St., London, S.W.
Gordon Watney, Ltd., Messrs., Weybridge
Green Engine Co., Ltd., Twickenham
Gwynnes, Ltd., Hammersmith Iron Works, Hammersmith, W.
Sturtevant Motors Co., 147, Queen Victoria St.
Sunbeam Motor Car Co., Ltd., Wolverhampton
The Gnome & Le Rhone Engine Co., Ltd., 47, Victoria St., S.W.

FABRICS AND YARNS—
Greeves & Morton, Franklin St., Belfast
MacLennan, J., & Co., 30, Newgate St., E.C. and at Glasgow. Tapes, Cords & Threads.

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Bournemouth Aviation Co., Ltd., Talbot Village, Bournemouth
Hall Aviation Co., London Aerodrome, Hendon

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Cowper-Coles Manufacturing Co., Sunbury-on-Thames
Boulton & Paul, Ltd., Rose Lane Works, Norwich

GEARS—
Moss Gear Co., Ltd., Thomas St., Aston, Birmingham

GLUE—
Adams & Co, Ltd., West Bromwich
Improved Liquid Glues Co., Ltd., Gt. Hermitage Street. (Croid.)
Mendine Co., 8, Arthur St, E.C.

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The Sperry Gyroscope Co., Ltd., 15, Victoria St., London, S.W.

INSTRUMENTS (Speed and Pressure Indicators, Revolution Counters, Altimeters, Watches, etc.)—
British Wright Co., Ltd., 33, Chancery Lane

MACHINE TOOLS—
Bliss, E. W., & Co., 2a, Pecock St., Blackfriars Rd., London, S.E.
Brewster & Co., 11, Queen Victoria St., E.C.

METAL PARTS AND FITTINGS—
Aircraft Supplies Co., Ltd., 17, John St., Theobald's Road, W.C.
Bayliss, Jones & Bayliss, Ltd., Wolverhampton (Bolts and Nuts)
Foster Engineering Co., Wimbledon
Mann, Egerton & Co., Ltd., 177, Cleveland St., London, W.
Mountford, Fredk., Ltd., Fremo Works, Lifford, Birmingham
Rubery, Owen & Co., Ltd., Darlaston
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Wooler Engineering Co., Ltd., Old Oak Lane, Willesden Junction, N.W.

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Anti-Glare Glass Co., Ltd., 78, Turnmill St., E.C.
Bowden Wire, Ltd., Willesden Junction
Brown Bros., Ltd., Great Eastern St., E.C
Edison Swan Electrical Co., Ponders End (Lamps)
Wm. Evans, 63, Pall Mall, S.W. (Gunmakers)
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General Aeronautical Co., Ltd., 30, Regent St., W. (Dope, Engines and Accessories)
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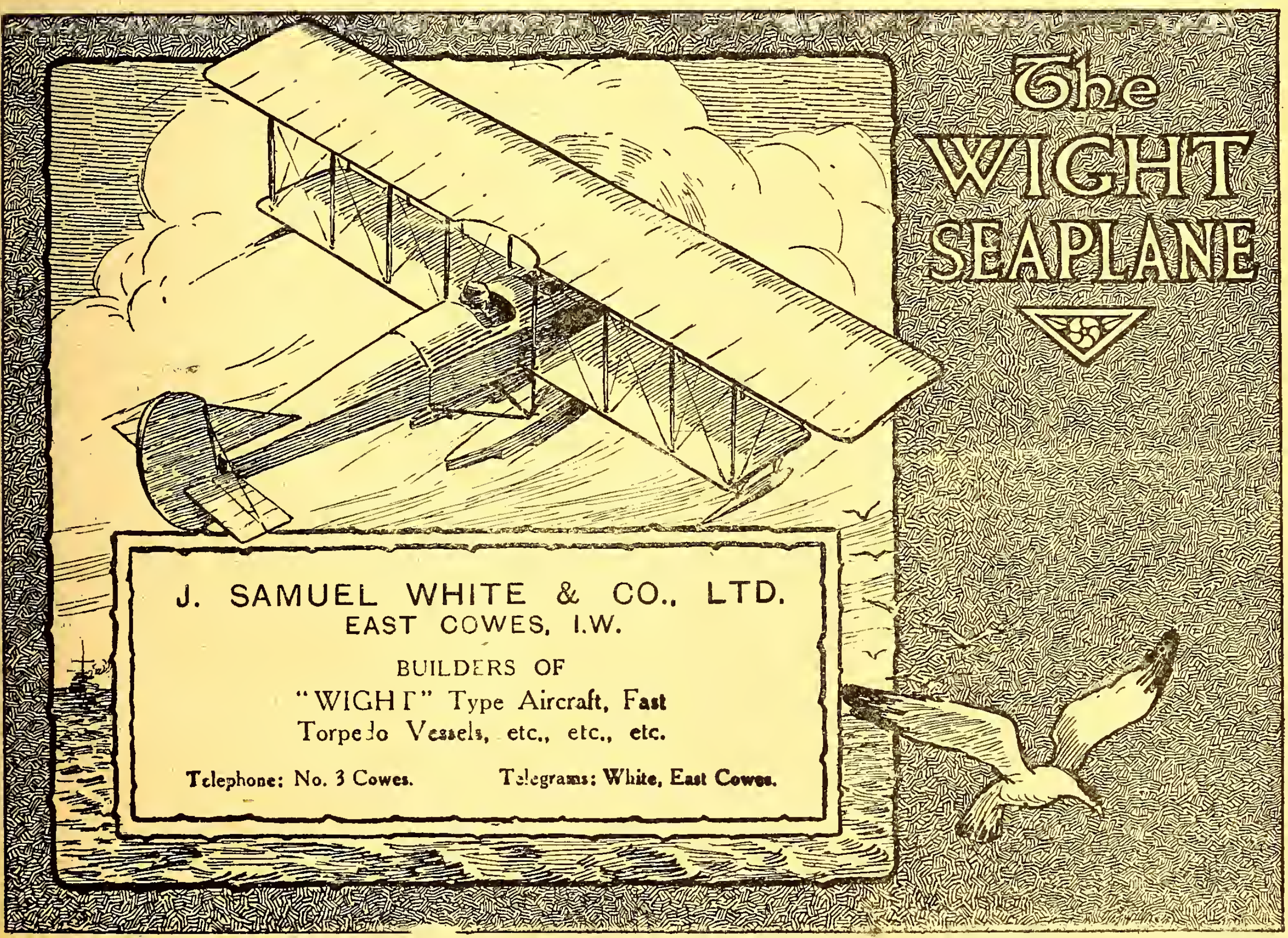

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(*Continued from page* 668.)

Res., and to be secd. ; Sec. Lt. (on prob.) A. H. Margoliouth, Yorks L.I., T.F., and to be secd. ; temp. Sec. Lt. (on prob.) E. D. Inskip, Gen. List, Feb. 18th, seny. from Dec. 2nd, 1916. Temp. Sec. Lt. (on prob.) H. A. Dyer, Gen. List, Feb. 18th, seny. from Dec. 11th, 1916. Lt. J. F. Procter, Can. Inf. Bn., seny. from Dec. 20th, 1916 ; temp. Sec. Lt. L. V. Munn, Leic. R., and to be transfd. to Gen. List, seny. from Dec. 23rd, 1916 ; Feb. 14th. Lt. J. R. Geddes, Can. Gen. List ; Sec. Lt. V. G. Southern, M.C., York and Lanc. R., and to be secd., Feb. 20th, seny. from Dec. 29th, 1916. The rank of Lt. E. J. D. Townesend, R.A., is as now described, and not as in the "Gazette" of Feb. 15th.

Balloon Officers.—Temp. Lt. E. B. Matthews, R. Berks R., and to be transfd. to Gen. List ; temp. Sec. Lt. W. J. Reid, Gen. List, from an Equipt. Officer, 3rd Cl. ; temp. Sec. Lt. A. G. Tremain, Gen. List, from an Equipt. Officer, 3rd Cl. ; temp. Sec. Lt. B. O. Butler, Gen. List, from an Equipt. Officer, 3rd Cl. ; temp. Sec. Lt. (on prob.) J. Toulmin, Gen. List ; temp. Sec. Lt. A. Smellie, Gen. List, from an Equipt. Officer, 3rd Cl., Jan. 31st.

Adjt.—Capt. A. P. Pargiter, M.C., R. Ir. R., and to be secd., Jan. 12th.

Equipt. Officers, 3rd Cl.—Temp. Sec. Lt. T. Jones, Gen. List, Nov. 30th, 1916. Sec. Lt. (on prob.) W. S. C. Stephens, Spec. Res., Dec. 30th, 1916. Sec. Lt. C. W Alexander, Spec. Res., Jan. 4th. Sec. Lt. R. Knott, Spec. Res., Jan. 8th. Sec. Lt. F. T. Hill, Spec. Res. ; temp. Sec. Lt. (on prob.) C. W. Waitt, Gen. List, Feb. 12th.

SCHOOLS OF MIL. AERONAUTICS.—Asst. Instr. (graded as an Equipt. Officer, 2nd Cl.).—Sec. Lt. W. J. King, N. Staff. R., from an Equipt. Officer, 3rd Cl., and to be temp. Lt. whilst so empld., Feb. 14th.

GEN. LIST.—R.F.C.—Cadets to be temp. Sec. Lts. (on prob.). —F. St. K. Anderson, B. St. J. H. Atteridge, P. G. Angood, C. L. Adamson, R. W. Anderson, J. Adam, C. A. Bainbridge, F. Barrie, H. A. Blain, W. R. Brookes, D.C.M., C. D. Barnard, P. S. Burge, E. D. Donisteel, L. W. Bisto, M. O. Baumann, J. F. T. Barrett, F. H. Brown, D. J. Barnes, N. D. Budgen, E. C. Clark, P. J. Cox, N. H. Crow, A. J. Chambers, V. C. Coombs, H. C. Chambers, O. Clayton, E. B. Crickmore, C. E. Crowly, J. A. C. Coston, J. A. Carruthers, C. H. Drew, R. Davis, S. J. Davies, T. G. Dixon, G. D. Daly, D. W. Dron, A. E. J. Dobson, F. H. Davies, H. J. Ellam, H. E. Eaton, N. Fitzgerald-Eager, E. Foster, R. H. G. Fenner, G. A. Fennemore, F. J. Foster, A. H. Gilbert, A. C. Goldsmith, H. P. Griffits, J. E. Goodman, H. M. Gardiner, E. R. Greenhow, A. A. G. Grace, E. Greenwood, L. J. Gowar, H. N. Hampton, H. R. Hodgson, H. V. Hall, F. W. Higgins, H. A. Hope, H. H. Deering, E. D. Haller, R. A. Harting, E. Holdsworth, S. H. Harland, H. P. J. G. Hamel, N. S. Huslop, S. C. Harker, A. A. Harris, W. V. Jakins, S. V. D. D. Jones, A. H. Jarvis, J. T. P. Jeyes, P. F. Kent, W. G. Kewley, H. W. Knowlson-Williams, A. S. Kelly, J. Kelly, C. N. L. Lomax, K. Loughlin, L. W. Lowen, M. Lowe, W. Luke, C. T. Lovell, R. W. Mouritzen, C. B. Millett, W. W. A. R. Murdoch, C. L. P. Mullany, A. Milner, D. M. McGoun, J. E. C. MaVcicker, R. A. McLaren, E. W. Morris, A. E. Muncaster, H. E. MacFarlane, K. Le G. Mills, Ebenezer B. Mercer, J. G. Moore, A. A. McConnell, F. Moore, R. E. Money-Lyrle, G. McPherson, I. D. R. McDonald, L. H. Mills, S. B. Martin, J. B. Maudsley, T. H. Newsome, G. L. Newman, G. A. Nicholson, G. Norrish, E. R. Ortner, M. G. M. Oxley, D. H. Ogden, J. A. O'Sulivan, G. R. C. Oliver, D. D. Phillips, H. B. Pett, A. E. Parks, J. R. Preece, C. F. K. Pierson, R. T. Paton, W. H. Peacock, R. G. Pratt, V. G B. Parton, D. J. Pilmore-Bedford, S. M. Park, G. N. Prout, N. C. Phear, G. A. H. Parkes, R. H. Reece, C. R. Rawbone, H. W. Reynard, D. T. C. Rundle-Woolcock, L. W. Ramage, P. J. Rodocanachi, J. Reekie, H. F. Stevens, R. H. Sawyer, J. D. P. Schofield, W. H. Stevenson, W. C. Smith, T M. Surgess, C. B. Simpson, G. Sulman, L. O. Spain, R. D. Starley, C. L. Smith, D. W. Sibley, P. L. Smith, L. M. Shadwell, C. M. Sayer, D. W. Stacey, S. C. Sillem, G. La T. Stooke, J. Stevenson, D. J. Sheehan, N. J. Taylor, W. H. Taylor, S. H. Taylor, R. D. K. Taylor, H. R. Tyler, R. Trattles, E. Vredenburg, E. S. Weiss, T. M. Willett, F. A. Watson, H. J. Watlington, J. L. Warwick, W. E. Warden, H. H. Wood, W. J. Watson, W. E. Watts, L. P. Wailis, F. Worswick, J. P. White, D. A. Wright, S. Waltho, W. Walker, G. R. Wight, J. S. Wood, Feb. 27th.

MEMORANDUM.—Sub-Lt. J. Thompson, from R.N.V.R., to be temp. Lt. on Gen. List, for duty with R.F.C., Jan. 20th, seny. from Oct. 28th, 1916.

SPECIAL RESERVE OF OFFICERS. — SUPPLEMENTARY TO REGULAR CORPS.—R.F.C.—The following Sec. Lts. (on prob.) are confirmed in rank :—D. H. Blaikie, M. M. Merriman, P. W. Renshaw, J. G. Thompson, C. W. Alexander, R. Knott, B. C. Adamson, F. T. Hill, H. N. O'Donnell, H. F. L. Dixon, C. H. Stevens, R. E. Littell, N. H. England, H. A. Hamersley,

To be Sec. Lts. (on prob.) :—G. A. Lush, D. J. Parry, Feb. 16th. The surname of Sec. Lt. (on prob.) H. A. Hamersley is as now described, and not as in "Gazette" of Nov. 22nd, 1916.

TERRITORIAL FORCE.—R.E.—Lt. W. R. B. Annesley is secd. for duty with the R.F.C., Jan. 26th.

* * *

From the "London Gazette," March 9th, 1917.

WAR OFFICE, March 9th.

REGULAR FORCES.—STAFF ATTACHED TO HEADQUARTER UNITS.—Brig Comdrs. :—Bt. Maj. G. S. Shephard, M.C., R. Fus. (from Wing Comdr. and temp. Lt.-Col., R.F.C.) and to be temp. Brig.-Gen. whilst so empld., vice Bt. Lt.-Col. (temp. Brig.-Gen.) D. Le G. Pitcher, Ind. Army.

ESTABLISHMENTS.—R.F.C.—MIL. WING.—Flying Officers (Observers).—Nov. 15th, 1916, seny. from dates shown against their names :—Temp. Sec. Lt. H. A. T. Trier, Gen. List, Aug. 23rd, 1915. Sec. Lt. W. L. Mills, R.A., and to be secd., Dec. 28th, 1915. Lt. W. A. Bishop, Can. Gen. List, Jan. 18th, 1916. Temp. Lt. H. A. V. Hill, Gen. List, March 7th, 1916. Temp. Lt. S. Stretton, Gen. List ; Sec. Lt. W. J. Wyatt, Devon R., and to be secd., Maroh 16th, 1916. Capt. H. E. F. Wyncoll, M.C., Notts and Derby R., and to be secd. ; Sec. Lt. R. M. Chaworth-Musters, Liec. R., and to be secd. ; temp. Sec. Lt. A. V. Blenkiron, attd. Som. L.I., and to be transfd. to the Gen. List ; temp. Sec. Lt. J. H. C. Walsh, A.S.C., and to be transfd. to the Gen. List, March 21st, 1916. Temp. Sec. Lt. A. Hughes, Gen. List ; temp. Sec. Lt. E. M. Roberts, Gen. List, April 16th, 1916. Sec. Lt. (temp. Capt.) T. Capel, A.S.C., and to be secd., April 19th, 1916. Temp. Lt. G. K. G. Kerr, Shrops. L.I., and to be transfd. to the Gen. List, April 23rd, 1916. Lt. G. A. H. Trudeau, R. Can. R. ; temp. Sec. Lt. R. F. Browne, Gen. List, April 30th, 1916. Sec. Lt. R. V. Tivy, Lond. R., T.F., and to be secd. ; temp. Sec. Lt. C. Baines, York and Lanc. R., and to be transfd. to the Gen. List, May 1st, 1916. Lt. A. B. Thorne, R.F.A., Speec. Res. ; temp. Sec. Lt. C. E. Pither, Gen. List, May 2nd, 1916. Sec. Lt. (temp. Lt.) W. H. Bragg, R.F.A., T.F., and to be secd , May 14th, 1916. Sec. Lt. A. A. Watson, R.F.A., T.F., and to be secd. ; temp. Sec. Lt. L. W. B. Parsons, Gen. List, May 15th, 1916. Temp. Sec. Lt. C P. Creighton, Gen. List, May 19th, 1916.

Temp. Lt. H. W. Guy, R. Fus., from attd. Serv. Bn. R. Fus., and to be transfd. to the Gen. List, Dec. 28th, 1916, with seny. from May 20th, 1916.

Nov. 15th, 1916, with seny. from the dates shown against their names :—Temp. Lt. A. G. Diamond, Gen. List, May 21st, 1916. Capt. G. L. Watson, W. Yorks R., T.F., and to be secd., May 23rd, 1916. Sec. Lt. J. I. M. O'Beirne, R. War. R., and to be secd. ; temp. Sec. Lt. H. Harris, attd. R. Lanc. R., and to be transfd to the Gen. List, May 26th, 1916. Lt. K. B. Brigham, R.F.A., T.F., and to be secd., June 2nd, 1916. Temp. Sec. Lt E. C. J. Elliot, Essex R., and to be transfd. to the Gen. List, June 3rd, 1916. Temp. Sec. Lt. L. S. White, Gen. List ; Lt. R. W. White, Can. Gen. List, June 5th, 1916. Temp. Lt. H. L. Waite, W. Rid. R., and to be transfd. to the Gen. List, June 6th, 1916. Temp. Sec. Lt. G. M. E. Bayly, Army Cyclists Corps, and to be transfd. to the Gen. List, June 7th, 1916. Temp. Lt. C. A. W. Thompson, R.A., and to be transfd. to the Gen. List, June 10th, 1916. Sec. Lt. E. F. Matthew, R.F.A., T.F., and to be secd., June 16th, 1916. Capt. T. Gibbons, Ches. R., T.F., and to be secd., June 17th, 1916.

Temp. Lt. G. H. Walker, 11th S. Lan. R., and to be transfd. to the Gen. List, Oct. 16th, 1916, with seny. from June 17th, 1916.

Nov. 15th, 1916, with seny. from the dates shown against their names :—Sec. Lt. (on prob.) A. Dewar, R.F.A., Spec. Res., June 17th, 1916. Lt. T. I. L. Lloyd, Mon. R., T.F., and to be secd., June 18th, 1916. Sec. Lt. E. V. Maclean, R.F.A., T.F., and to be secd., June 19th, 1916. Sec. Lt. W. S. Mansell, E. Surr. R., Spec. Res., from R. Suss. R., June 20th, 1916. Lt. A. Anderson, Conn. Rang., Spec. Res., and to remain secd., Nov. 2nd, 1916, seny. from June 20th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names :—Temp. Sec. Lt. E. H. Kann, N. Lan. R., and to be transfd. to the Gen. List, July 1st, 1916. Sec. Lt. W. Helmore, R.A., and to be secd., July 3rd, 1916. Sec. Lt. D. Lindsay, High. Div. Cyc. Co., T.F., and to be secd., July 6th, 1916. Temp. Lt. W. C. Foster, Wilts R., and to be transfd to the Gen. List ; temp. Lt. C. V. Clayton, Army Cyclist Corps, from L'pool R., and to be transfd. to the Gen. List, July 8th, 1916. Sec. Lt. L. M. Elworthy, Essex R., and to be secd. ; Sec. Lt. R. St. J. Hartley, Devon R., and to be secd., July 9th, 1916. Lt. H. M. Yeatman, Wilts R., Spec. Res., July 10th, 1916. Temp. Sec. Lt. I. T. Smith, attd. Midd'x R., and to be transfd. to the Gen. List, July 10th, 1916. Sec. Lt. (temp. Lt.) W. D. Cullen, E. Surr. R., T.F., and to be secd., July 10th, 1916. Sec. Lt. (temp. Lt.) L. D. Baker, R. Dub. Fus., Spec. Res., and to be secd., July 10th, 1916. Temp. Sec. Lt. H. Simonis, R.A., and to be transfd. to Gen. List, July 10th, 1916. Sec. Lt. T. S. Pearson, M.C., R.A., and to be secd., July 10th, 1916.

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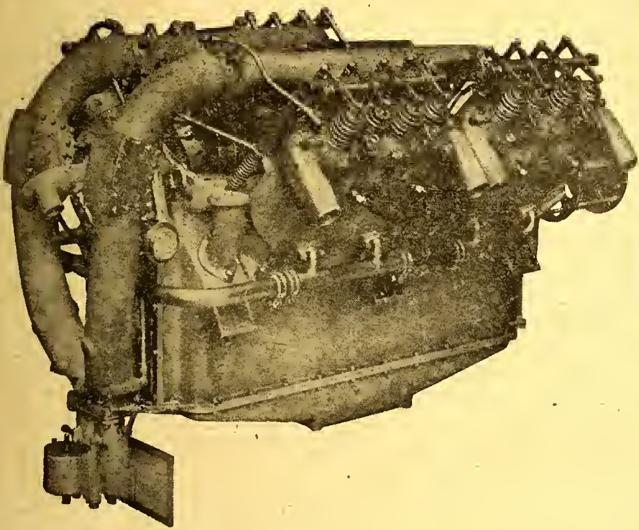

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Sec. Lt. (temp. Lt.) K. J. B. Munro, Devon R., Spec. Res., and to be secd., Nov 16th, 1916, with seny. from July 10th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Lt. B. FitzH. Randall, Ind. Cav., July 11th, 1916. Sec. Lt. C. E. Barrington, R.A., and to be secd., July 11th, 1916. Sec. Lt. E. C. Colman, Wilts R., Spec. Res., and to be secd., July 11th, 1916. Temp. Sec. Lt. A. N. Donnet, Army Cyclist Corps, from attd. R. War. R., and to be transfd. to the Gen. List, July 12th, 1916. Sec. Lt. K. Norwood, N. Lan. R., T.F., and to be secd., July 12th, 1916. Temp. Lt. J. P. Greenwood, A.S.C., and to be transfd to the Gen. List, July 14th, 1916. Sec. Lt. E. J. H. Douch, R.A., and to be secd., July 14th, 1916. Lt. A. P. McLean, Canadian Inf., July 17th, 1916. Temp. Lt. R. N. K. Jones, A.S.C., and to be transfd. to the Gen. List, July 24th, 1916. Temp. Sec. Lt. D. L. Reed, Notts and Derby R., July 25th, 1916. Lt. A. S. Taylor, Can. Mtd. Rif., July 26th, 1916. Temp. Lt. V. N. F. Surtees, K.O. Sco. Bord., and to be transfd. to Gen. List, July 26th, 1916.

Temp. Sec. Lt. S. A. Gibbons, Gen. List, Nov. 16th, 1916, with seny. from July 26th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Capt. C. F. Gordon, M.C., N. Staff. R., and to remain secd., July 27th, 1916. Temp. Sec. Lt. (on prob.) J. B. Pirie, A.S.C., and to be transfd. to Gen. List, July 27th, 1916. Temp. Sec. Lt. C. W. Duffield, Essex R., and to be transfd. to Gen. List, July 27th, 1916. Temp. Sec. Lt. A. F. Kelly, A.S.C., and to be transfd. to Gen. List, July 27th, 1916. Temp. Sec. Lt. C. H. Keefe, Army Cyclist Corps, and to be transfd. to Gen. List, July 28th, 1916. Temp. Lt. J. V. Barry, A.S.C., and to be transfd. to Gen. List, July 29th, 1916.

Sec. Lt. (temp. Lt.) A. H. George, Ches. R., T.F., and to be secd., Nov. 16th, 1916, with seny. from July 31st, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Sec. Lt. H. S. Royffe, Midd'x R., T.F., and to be secd., July 31st, 1916. Temp. Sec. Lt. W. A. Taylor, Army Cyc. Corps, from attd. Sco. Rif., and to be transfd. to the Gen. List, July 31st, 1916. Sec. Lt. S. M. Smith, Lond. R., T.F., and to be secd., July 31st, 1916. Sec. Lt. W. J. Pierce, L'pool R., Spec. Res., and to be secd., July 31st, 1916. Temp. Sec. Lt. C. H. Graham, High. L. I., and to be transfd. to Gen. List, July 31st, 1916.

Sec. Lt. (temp. Lt.) F. D. Murphy, Div. Cyclist Cos., T.F., and to be secd., Dec. 31st, 1916, with seny. from Aug. 1st, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Lt. H. C. Waghorn, Lond R., T.F., and to be secd., Aug. 2nd, 1916. Temp. Capt. J. F. Davison, Gen. List, Aug. 3rd, 1916. Temp. Lt. T. H. Clarke, Army Ord. Dept., and to be transfd. to Gen. List, Aug. 3rd, 1916. Lt. C. W. MacAloney, Can. Inf. Bn., Aug. 3rd, 1916.

Lt. W. D. Thomson, Can. Inf., Nov. 18th, 1916, with seny. from Aug. 3rd, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Sec. Lt. H. M. Gibbs, Bedf. R., and to be transfd. to Gen. List, Aug. 3rd, 1916. Temp. Sec. Lt. W. E. L. Cass, Gen. List, Aug. 3rd, 1916.

Sec. Lt. (on prob.) H. Scholtz, R.F.A., Spec. Res., Sept. 1st, 1916, with seny. from Aug. 3rd, 1916. Temp. Sec. Lt. H. N. Lett, R Berks R., and to be transfd. to Gen. List, Oct. 6th, 1916, with seny. from Aug. 4th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Sec. Lt. W. M. V. Cotton, Gen. List, Aug. 4th, 1916. Temp. Sec. Lt. A. Kock, Gen. List, Aug. 4th, 1916. Sec. Lt. A. V. Shewell, Glouc. R., and to be secd., Aug. 4th, 1916. Temp. Lt. C. B. Bird, M.C., R.A., and to be transfd. to Gen. List, Aug. 5th, 1916. Temp. Lt. J. B. C. Madge, R.A., and to be transfd. to Gen. List, Aug. 5th, 1916. Temp. Sec. Lt. L. M. Maxwell, Essex R., and to be transfd. to Gen. List, Aug. 5th, 1916.

Sec. Lt. G. J. Ogg, High. L.I., T.F., and to be secd., Nov. 1st, 1916, with seny. from Aug. 6th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Sec. Lt. G. A. Soutt, Midd'x R., T.F., and to be secd., Aug. 6th, 1916. Lt. P. R. Cawdell, A.S.C., T.F., and to be secd., Aug. 7th, 1916. Sec. Lt. H. G. P. Ovenden, E. Surr. R., and to be secd., Aug. 7th, 1916. Temp. Sec. Lt. (on prob.) M. E. Mealing, Shrops. L.I., Aug. 7th, 1916. Temp. Sec. Lt. C. F. Drabble, Durh. L.I., and to be transfd. to Gen. List, Aug. 7th, 1916.

Temp. Sec. Lt. S. T. Payne, R. W. Surr. R., and to be transfd. to Gen. List, Aug. 7th, 1916.

Sec. Lt. L. B. Jones, Welsh R., T.F., and to be secd., Dec. 31st, 1916, with seny. from Aug. 7th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Sec. Lt. A. G. Mortlock, Army Cyclist Corps, and to be transfd. to Gen. List, Aug. 8th, 1916. Sec. Lt. F. B. O'Dowd, Midd'x R., T.F., and to be secd., Aug. 9th, 1916.

Temp. Lt. R. Affleck, A.S.C., and to be transfd. to Gen. List, Nov. 1st, 1916, with seny. from Aug. 10th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Lt. E. J. McLoughlin, R. Sussex R., and to be transfd. to Gen. List, Aug. 10th, 1916. Temp. Lt. G. P. Colin, Gen. List, Aug. 10th, 1916. Sec. Lt. S. H. Griffiths, Ches. R., and to be secd., Aug. 10th, 1916. Temp. Sec. Lt. G. E. Barnett, attd. D. of Corn. L.I., and to be transfd. to Gen. List, Aug. 10th, 1916.

Temp. Sec. Lt. N. W. Morrison, Gen. List, Dec. 28th, 1916, with seny. from Aug. 10th, 1916:—Temp. Lt. E. G. S. Gordon,

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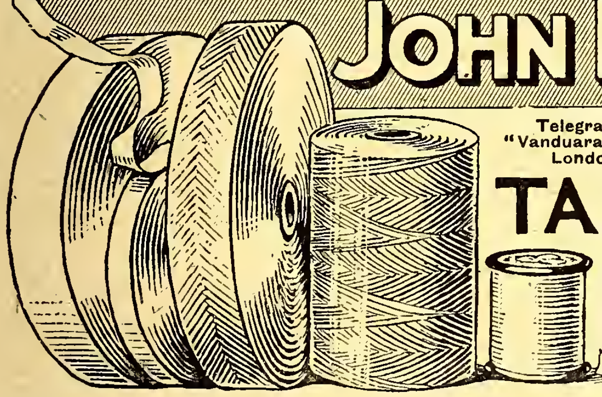

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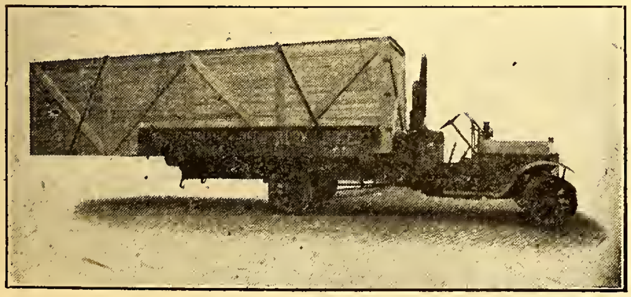

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High. L.I., and to be transfd. to Gen. List, Jan. 9th, with seny. from Aug. 12th, 1916. Sec. Lt. A. Emmerson, Leic. R., T.F., and to be secd., Dec. 10th. 1916, with seny. from Aug. 12th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Sec. Lt. H. V. Northam, Notts and Derby R., and to be transfd. to Gen. List, Aug. 13th, 1916. Temp. Sec. Lt. J. T. Gibbon, Gen. List, Aug. 15th, 1916. Temp. Lt. R. Goudie, High. L.I., Aug. 17th, 1916.

Sec. Lt. L. B. Potts, M.C., S. Wales Bord., and to be secd., Nov. 11th, 1916, with seny. from Aug. 17th, 1916 Temp. Sec. Lt. G. A. Forrest, A.S.C., and to be transfd. to Gen. List, Oct. 21st, 1916, with seny. from Aug. 21st, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Lt. R. T. Fagan, A.S.C., and to be transfd, to Gen. List, Aug. 24th, 1916. Temp. Sec. Lt. C. H. Marchant, Gen. List, Aug. 25th, 1916. Lt. A. H. M. Copeland, Canadian A.S.C., Aug. 26th, 1916. Sec. Lt. (on prob.) E. E. Macartney, R.G.A., Spec. Res., Aug. 26th, 1916. Sec. Lt. F. A. Prescott, Border R., Spec. Res., and to be secd., Aug. 26th, 1916. Temp. Sec. Lt. R. J. E. P. Goode, R. Ir. Fus., and to be transfd. to Gen. List, Aug. 26th, 1916. Sec. Lt. F. M. Corry, Notts and Derby R., T.F., and to be secd., Aug. 26th, 1916. Sec. Lt. G. G. Coury, V.C., S. Lan. R., Spec. Res., from attd. S. Lan. R., T.F., and to be secd., Aug. 28th, 1916 Temp. Sec. Lt. C. E. Maslin, Bedf. R., and to be transfd. to Gen. List, Aug. 28th, 1916.

Lt. F. E. Brown, R. Dub. Fus., Spec. Res., and to be sec., Jan. 4th, with seny. from Aug. 29th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Sec. Lt. W. T. Jourdan, Gen. List, Aug. 29th, 1916. Sec. Lt. H. J. Davis, Linc. R., Spec. Res., and to be secd., Aug. 29th, 1916.

Temp. Sec. Lt. W. E. W. Cushing, Norf. R., and to be transfd. to Gen. List, Dec. 31st, 1916, with seny. from Aug. 29th, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Lt. W. A. Landry, Can. Art., Aug. 30th, 1916. Temp. Sec. Lt. J. W. Aldred, R. Lan. R., and to be transfd. to Gen. List, Aug. 30th, 1916.

Temp. Sec. Lt. H. W. Soulby, Suff. R., and to be transfd. to Gen. List, Jan. 2nd, with seny from Aug. 30th, 1916. Sec. Lt. H. D. Hewett, E. Kent R., Spec. Res., and to be secd., Dec. 31st, 1916, with seny. from Aug. 31st, 1916.

Nov. 15th, 1916, with seny. from dates shown against their names:—Temp. Sec. Lt. C. P. Ranger, Lan. Fus., Sept. 1st, 1916. Temp. Sec. Lt. C. T. Brown, Midd'x R., and to be transfd. to Gen. List; Sept. 1st, 1916. Temp. Sec. Lt. B. Pool, Gen. List, Sept. 1st, 1916.

Sec. Lt. A. O. Macniven, High. L.I., T.F., and to be secd., Nov. 20th, 1916, with seny. from Sept. 4th, 1916. Temp. Sec. Lt. J. R. Hopkins, R. Scots, and to be transfd. to Gen. List, Dec. 28th, 1916, with seny from Sept. 4th, 1916. Temp. Lt. G. P. Morris, Oxf. and Bucks L.I., and to be transfd. to Gen. List, Nov. 1st, 1916, with seny. from Sept. 5th, 1916. Lt. (temp. Capt.) P. E. Welchman, R.E., T.F., and to be secd., Nov. 15th, 1916, with seny. from Sept. 6th, 1916. Sec. Lt. (temp. Lt.) C. B. M. Dale, North'd Fus., T.F., and to be secd., Dec. 3rd, 1916, with seny. from Sept. 6th, 1916. Temp. Lt. J. R. Wilson, R.E., T.F., Dec. 14th, 1916, with seny. from Sept. 6th, 1916.

Dec. 16th, 1916, with seny. from dates shown against their names:—Temp. Sec. Lt. H. Faull, attd. N. Lan. R., and to be transfd. to Gen. List, Sept. 6th, 1916. Temp. Sec. Lt. C. H. Mather, attd. N. Staff. R., and to be transfd. to Gen. List, Sept. 6th, 1916. Temp. Sec. Lt. A. P. Adams, Gen. List, Sept. 6th, 1916.

Sec. Lt. F. C. Brooks, R.A., and to be secd., Dec. 17th, 1916, with seny. from Sept. 6th, 1916. Sec. Lt. L. J. Purgold, R.F.A., T.F., and to be secd., Dec. 18th, 1916, with seny. from Sept. 6th, 1916. Sec. Lt. E. E. S. Wheatley, R.A., and to be secd., Dec. 19th, 1916, seny. from Sept. 6th, 1916. Temp. Sec. Lt. J. H. McLennan, Gen. List, Dec. 28th, 1916, seny. from Sept. 9th, 1916.

Nov. 15th, 1916, seny. from dates shown:—Temp. Sec. Lt. C. P. R. Holdcroft, Gen. List, Sept. 10th, 1916. Temp. Lt. H. G Collins, A.S.C., and to be transfd to the Gen. List, Sept. 11th, 1916. Temp. Sec. Lt. A. N. Martyn, Gen. List, Sept. 11th, 1916.

Temp. Sec. Lt. C. H. P. Ewbank, Gen. List, Nov. 16th, 1916, seny. from Sept. 11th, 1916. Sec. Lt. A. L. M. Van der Byl, R.F.A., Spec. Res., Nov. 1st, 1916, seny. from Sept. 13th, 1916.

Nov. 15th, 1916, seny. from dates shown:—Sec. Lt. R. D. W. McKergow, D. Gds., and to be secd., Sept. 13th, 1916. Sec. Lt. W. V. Gray, 4th N. Lan. R., T.F., and to be secd., Sept. 14th, 1916. Temp. Lt. L. F. D. Lutyens, R. Fus., and to be transfd. to the Gen. List, Sept. 15th, 1916. Temp. Sec. Lt. R. D. Elliott, Shrops. L.I., and to be transfd. to the Gen. List, Sept. 15th, 1916. Sec. Lt. H. C. Ainger, R. Scots, Spec. Res., and to be secd., Sept. 15th, 1916.

Temp. Sec. Lt. H. B. Mann, Gen. List, Dec. 28th, 1916, seny. from Sept. 15th, 1916. Sec. Lt. (temp. Lt.) W. R. Adkins, Lond. R., T.F., and to be secd., Nov. 1st, 1916, seny. from Sept. 16th, 1916.

Nov. 15th, 1916, seny. from dates shown:—Sec. Lt. C. S. T. Lavers, W. York R., Spec. Res., and to be secd., Sept. 16th, 1916. Sec. Lt. E. W. Monk, Lond. R., T.F., and to be secd., Sept. 16th, 1916.

Temp. Sec. Lt. W. Hallitt, North'd Fus., and to be transfd. to the Gen. List, Dec. 28th, 1916, seny. from Sept. 17th, 1916.

Nov. 15th, 1916, seny. from date shown.—Lt. N. L. Sheppard, Canadian Inf. Bn., Sept. 18th, 1916. Lt. W O. Boger, Lord Strathcona's Horse, Sept. 18th, 1916. Sec. Lt. P. C. Routley, Welsh R., T.F., and to be secd., Sept. 18th, 1916.

Sec. Lt. (temp. Lt.) E. D. G. Galley, A.S.C., and to be secd., Nov. 24th, 1916, seny. from Sept. 18th, 1916.

Nov. 15th, 1916, seny. from dates shown:—Temp. Sec. Lt. F. A. Fyfe, M.C., L'pool R., and to be transfd. to the Gen. List; temp. Sec. Lt. W. W. Fitzgerald, Gen. List, Sept. 19th, 1916. Temp. Lt. A. L. Harrow-Bunn, Notts and Derby R., and to be transfd. to the Gen. List; temp. Sec. Lt. F. W. A. Vickery, Dur. L.I., Sept. 20th, 1916.

Sec. Lt. R. M. C. Macfarlane, R.A., and to be secd., Oct. 28th, 1916, seny. from Sept 21st, 1916. Temp. Sec. Lt. R. Fletcher, North'l Fus., and to be transfd. to the Gen. List, Nov. 27th, 1916, seny. from Sept. 21st, 1916. Temp. Sec. Lt. H. C. Barr, Gen. List, Dec. 6th, 1916, seny. from Sept. 21st, 1916. Sec. Lt. J. N. Wilkinson, E. Lanc. R.E., T.F., and to be secd., Nov. 17th, 1916, seny. from Sept. 22nd, 1916. Temp. Sec. Lt. J. R. Orrell, Manch. R., and to be transfd. to the Gen. List, Nov. 16th, 1916, seny. from Sept. 26th, 1916. Sec. Lt. J. M. R. Miller, K.O. Sco. Bord., Spec. Res., and to be secd., Dec. 3rd, 1916, seny. from Sept. 26th, 1916. Temp. Sec. Lt. F. M. C. Houghton, Army Cyclist Corps, and to be transfd. to the Gen. List, Dec. 22nd, 1916, seny. from Sept. 27th, 1916. Temp. Sec. Lt. (on prob.) W. Steer, Gen. List, Nov. 15th, 1916, seny. from Sept. 27th, 1916. Temp. Lt. A. D. Roberts, M.C., Sco. Rif., and to be transfd. to the Gen. List, Nov. 16th, 1916, seny. from Sept. 28th, 1916. Temp. Sec. Lt. E F. W. Smith, Leins. R., and to be transfd. to the Gen. List, Nov. 15th, 1916, seny. from Sept. 28th, 1916. Sec. Lt. (temp. Lt.) J. Cullen, Yeo. T.F., and to be secd., Nov. 29th, 1916, seny. from Sept. 29th, 1916. Temp. Sec. Lt. G. R. Thorne, A.S.C., and to be transfd. to the Gen. List, Dec. 2nd, 1916, seny. from Oct. 2nd, 1916. Temp. Sec. Lt. J. K. Campbell, Gen. List, Dec. 3rd, 1916, seny. from Oct. 3rd, 1916. Temp. Sec. Lt. J. E. Le Gallais, Gen. List, Jan. 9th, seny. from Oct. 3rd, 1916. Sec. Lt. (temp. Lt.) E. L. Chadwick, R. War. R., T.F., and to be secd., Nov. 16th, 1916, seny. from Oct. 5th, 1916. Temp. Sec. Lt. W. Harms, North'd Fus., and to be transfd. to the Gen. List, Dec. 31st, 1916, seny. from Oct. 5th, 1916. Temp Sec. Lt. N. M. H. Vernham, Gen. List, Nov. 16th, 1916, seny. from Oct. 6th, 1916. Temp. Sec. Lt. F. Young, Gen. List, Nov. 18th, 1916, seny. from Oct. 6th, 1916. Temp. Sec. Lt. H. A. R. Biziou, York R., and to be transfd. to the Gen. List, Nov. 23rd, 1916, seny. from Oct. 6th, 1916. Lt. G. J. O. Brichta, Canadian Mtd. Rif., Nov. 16th, 1916, seny. from Oct. 7th, 1916 Temp. Sec. Lt. V. C. Manuel, Gen. List, Nov. 15th, 1916, seny from Oct. 10th, 1916. Temp. Sec. Lt. C. V. Palmer, attd. Norf. R., and to be transfd. to Gen. List, Dec. 10th, 1916, seny. Oct. 10th, 1916. Sec. Lt. H. I. Fordred, Lond. R., T.F.; and to be secd., Jan. 6th, seny. Oct. 10th, 1916. Temp. Sec. Lt. C. St. C. Acheson, Gen. List, Dec. 28th, 1916, seny. from Oct. 12th, 1916. Temp. Sec. Lt. A. W. Waddy, Gen. List, Dec. 28th, 1916, seny. Oct. 13th, 1916. Temp. Sec. Lt. G. G. Williams, Gen. List, Nov. 15th, 1916, seny. Oct. 14th, 1916. Temp. Sec. Lt. A. W. Clarke, Gen. List, Jan. 3rd, seny. Oct. 14th, 1916. Sec. Lt. (temp. Lt.) F. Surgey, Div. Cyclist Co., T.F., and to be secd., Nov. 15th, 1916, seny. Oct. 15th, 1916. Temp. Lt. H. E. Bellamy, Midd'x R., and to be transfd. to Gen. List, Jan. 9th, seny. from Oct. 16th, 1916. Sec. Lt. G. C. Gardner, R. Ir. Regt., from Machine Gun Corps, and to remain secd., Dec 15th, 1916, seny. from Oct. 16th, 1916. Temp. Lt. J. A. Ainscow, R. War. R., and to be transfd. to Gen. List, Dec. 13th, 1916, seny. Oct. 17th, 1916. Temp. Sec. Lt. H. S. Elliott, Gen. List, Jan. 6th, seny. Oct. 17th, 1916.

Jan. 9th, 1917, with seny. from dates shown against their names:—Temp. Sec. Lt. H. Brooks, Gen. List, Oct. 17th, 1916. Temp. Capt. L. Findlay, attd. High. L.I., and to be transfd. to Gen. List, Oct. 20th, 1916. Lt. S. C. Tinne, R. W. Kent R., and to be secd., Oct. 20th, 1916. Lt. E. G. F. Thomson, Essex R., T.F., and to be secd., Oct. 20th, 1916. Sec. Lt. G. Bryers, N. Lan. R., T.F., and to be secd., Oct. 20th, 1916.

Temp. Sec. Lt. H. J. H. Dicksee, Gen. List, Nov. 15th, 1916, seny., Oct. 21st, 1916. Temp. Sec. Lt. G. Everingham, Gen. List, Dec. 7th, 1916, seny. Oct. 21st, 1916. Sec. Lt. G. R. Y. Stout, Argyll and Suth'd. Hgrs., T.F., and to be secd., Jan. 4th, seny. Oct. 21st, 1916. Sec. Lt. J. E. S. P Bradford, W. Rid. R., from a Balloon Officer, Jan. 9th, seny. from Oct. 21st, 1916. Sec. Lt. J. B. Weir, Sea. Highrs., T.F., and to be secd., Dec. 28th, 1916, seny. Oct. 22nd, 1916. Temp. Sec. Lt. H. G. W. Debenham, Gen. List, Jan. 9th, seny. from Oct. 24th, 1916. Temp. Sec. Lt. C. G. Durham, Gen. List, Dec. 16th,

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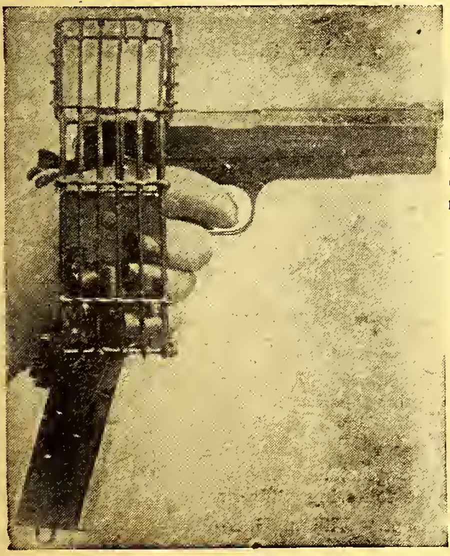

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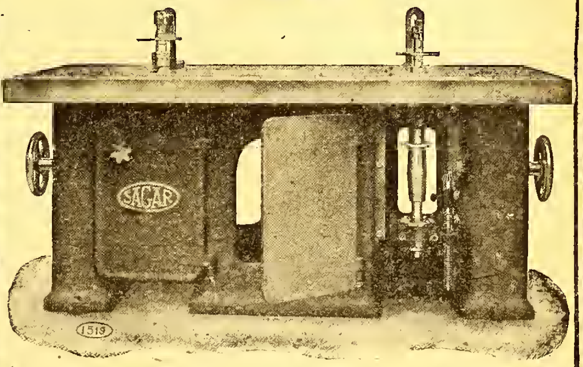

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1916, seny. from Oct. 25th, 1916. Sec. Lt. (temp. Lt.) J. T. Quick, Devon. R., T.F., and to be secd., Jan. 9th, seny. from Oct. 26th, 1916. Temp. Sec. Lt. E. R. Stewart, Gen. List, Dec. 28th, 1916, seny. Oct. 26th, 1916. Sec. Lt. C. B. Catnach, North'd. Fus., T.F., and to be secd., Jan. 9th, seny. Oct. 26th, 1916. Sec. Lt. G. Masters, New Zealand Pioneer Bn., Dec. 28th, 1916, seny. Oct. 27th, 1916. Temp. Sec. Lt. A. C. Heaven, Gen. List, Dec. 31st, 1916, seny. Oct. 27th, 1916. Sec. Lt. R. Hamilton, High. Cyclist Bn., T.F., and to be secd., Jan. 4th, seny. from Oct. 27th, 1916. Temp. Sec. Lt. W. Kellett, Som. L.I., and to be transfd. to Gen. List, Jan. 13th, seny. from Oct. 28th, 1916. Temp. Sec. Lt. H. E. Freeman-Smith, R.E., Dec. 28th, 1916, seny. from Oct. 29th, 1916. Lt. C. F. Wolley-Dod, Notts and Derby R., and to be secd, Dec. 3rd, 1916, seny. Oct. 30th, 1916. Temp. Maj. J. A. C. Wright, A.S.C., Jan. 9th, seny. from Oct. 31st, 1916. Temp. Lt. L. H. Jones, York R., and to be transfd. to Gen. List, Jan. 9th, seny, from Oct. 31st, 1916. Temp. Sec. Lt. T. B. Jones, Gen. List, Dec. 23rd, 1916, seny. Nov. 2nd, 1916. Sec. Lt. A. W. Phillips, M.C., R. Fus., Spec. Res., and to be secd., Jan. 6th, seny. Nov. 2nd, 1916. Temp. Sec. Lt. F. C. Coops, L'pool R., and to be transfd. to Gen. List, Jan. 6th, seny, Nov. 4th, 1916. Sec. Lt. (on prob.) B. J. Venn, R.E., Dec. 28th. 1916, seny. Nov. 5th, 1916. Temp. Sec. Lt. R. Cameron, Gen. List, Dec. 31st, 1916, seny. Nov. 10th, 1916. Temp. Lt. G. E. Gibons, Garr. Bn., N. Staff. R., and to be transfd. to Gen. List, Jan. 9th, seny. Nov. 15th, 1916. Temp. Lt. E. Burney, M.C., Gen. List, Jan. 13th, seny. Nov. 25th, 1916. Lt. A. R. Leggo, Canadian Gen. List, Dec. 31st, 1916, seny. from Nov. 29th, 1916. Capt. C. Fawssett, R. Suss. R., T.F., and to be secd., Jan. 13th, seny. from Dec. 4th, 1916.

R.F.C.—Mil. Wing.—Flying Officers.—Temp. Lt. P. P. C. Penberthy, attd. Shrops. L.I., and to be transfd. to Gen. List; temp. Sec. Lt. (on prob.) R. N. Swann, Gen. List, Feb. 13th. Temp. Lt. R. A. Walmisley, Gen. List, from a Flying Officer (Observer), with seny. May 30th, 1916. Sec. Lt. W. O. B. Winkler, R.G.A., T.F., and to remain secd.; Sec. Lt. K. B. Cooksey, R.W.K.R., Spec. Res., and to be secd., Feb. 19th. From Flying Officers (Observers).—Sec. Lt. (temp. Lt.) H. R. Jaques, S. Staff. R., Spec. Res., Feb. 18th, seny. Dec. 26th, 1915. Lt. J. A. G. Brewis, Durh. L.I., Spec. Res., seny. May 1st, 1916. Temp. Sec. Lt. (temp. Lt.) F. Sharpe, Notts and Derby R., seny. June 3rd, 1916. Temp. Sec. Lt. L. C. Chapman, Gen. List, seny. June 3rd, 1916, Feb. 20th.

Equipment Officers, 2nd Cl.—Sec. Lt. (temp. Capt.) J. C. Briggs, Leic. R., T.F., from 3rd Cl., Jan. 1st. 3rd Cl.—Hon. Lt. L. W. Wethered, T.F., Res., and to be transfd. to Gen. List, Feb. 8th. Temp. Sec. Lt. J. A. Woods, Gen. List, Feb. 15th. Sec. Lt. (on prob.) A. S. Windsor, Spec. Res.; Sec. Lt. B. C. Adamson, Spec. Res., Feb. 20th. Sec. Lt. E. Dodson, Spec. Res., Feb. 23rd.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Mil. Wing.—Sec. Lt. H. P. Tempest relinquishes his commn. on account of ill-health, and is granted the hon. rank of Sec. Lt., March 10th. Sec. Lts. (on prob.) are confirmed in their rank:—E. Dodson, A. J. J. Lamb. To be Sec. Lts. (on prob.):—J. F. Bargman, Feb. 9th. W. T. Hanson, Feb. 12th.

TERRITORIAL FORCE.—Yeomanry.—Sec. Lt. R. E. Eversden is secd. for duty with the R.F.C., Jan. 12th.

Infantry.—Norfolk R.—Sec. Lt. A. H. W. Fleming is secd. for duty with the R.F.C., Jan. 12th.

R. Sussex R.—Sec. Lt. F. H. Dear is secd. for duty with the R.F.C., Jan. 12th.

Manch. R.—Capt. A. Clear is secd. for duty with R.F.C. Jan. 12th.

Rif. Brig.—Sec. Lt. H. C. Brufton is secd. for duty with R.F.C., Jan. 10th.

Herefords R.—Sec. Lt. R. W. Reeve is secd. for duty with R.F.C., Jan. 14th.

* * *

From the "London Gazette" Supplement, March 9th, 1917.

War Office, March 9th.

The following are among the Decorations and Medals awarded by the Allied Powers at various dates to the British Forces for distinguished services rendered during the course of the campaign. The King has given unrestricted permission in all cases to wear the Decorations and Medals in question:—

Decorations conferred by the President of the French Republic:

Croix de Guerre.

Sec. Lt. Horace Martin Capon Ledger, I. A. Res., attd. French Seaplane Squadron, Oct. 28th, 1915.

No. 208 Sergt.-Maj. Albert Hunter, R.F.C. (now Sec. Lt., W. Riding Regt., attd. R.F.C.), Feb. 8th, 1917.

Decorations and Medals conferred by the King of Montenegro, Oct. 31st, 1916:—

Silver Medal for Bravery.

Sec. Lt. (temp. Capt.) John Oliver Andrews, M.C., R. Scots and R.F.C.

Sec. Lt. Arthur Lionel Gordon-Kidd, R.F.C.

Decorations conferred by the Sultan of Egypt:—

Order of the Nile, 4th Class.

Capt. Stuart Grant-Dalton, D.S.O., Yorks Regt. and R.F.C.
Maj. Arthur Justin Ross, D.S.O., R.E. and R.F.C.
Temp. Capt. Helperus Andrias Van Ryneveld, M.C., R.F.C.

* * *

From the "London Gazette" Supplement, March 10th, 1917.

War Office, March 10th.

REGULAR FORCES.—Establishments.—R.F.C.—Military Wing.—Park Comdr.—The appt. of Capt. (temp. Maj.) F. L. Scholte, Spec. Res., notified in the "Gazette" of Jan. 19th, is post-dated to Nov. 10th, 1916.

Equipment Officers, 1st Cl.—From Staff Lts.:—Temp. Capt. R. A. Coote, Gen. List; Sec. Lt. T. Goulburn, Spec. Res., and to be temp. Capt. whilst so employed, Dec. 14th, 1916.

2nd Cl.—Sec. Lt. R. W. Billinghurst, Spec. Res., from a Staff Lt., and to be temp. Lt. whilst so employed:—From the 3rd Cl., and to be temp. Lts. whilst so empld.:—Sec. Lts., Spec. Res.—A. C. Hartley, L. B. W. Jolly, T. C. Thrupp, J. M. Heesem, J. D. Coales, T. Jones, R. G. Booth, E. W. Walford, C. H. Drabble, F. E. Pike, A. L. Butcher, A. O. Betts. Capt. J. W. G. Mackinlay, Spec. Res., from the 3rd Cl.; Capt. R. W. Thomas, Lond. R., T.F.; temp. Lt. J. Jensen, Gen. List; temp. Lt. C. H. T. Alston, High. L.I., and to be transfd. to Gen. List, Dec. 14th, 1916. Temp. Lt. H. Atkins, A. Ord. Dept., and to be transfd. to Gen. List, Jan. 1st. Sec. Lt. (temp. Lt.) S. J. Waters, R.F.C., T.F., and to be secd., Jan. 26th.

3rd. Cl.—Temp. Sec. Lt. W. G. M. Nicholl, Gen. List, April 17th, 1916 (substituted for notification in the "Gazette" of May 4th, 1916). Sec. Lt. F. J. Collet, R.E., T.F., Dec. 14th, 1916. Lt. T. G. Skeats, R. Fus., Spec. Res., Jan. 1st.

SPECIAL RESERVE OF OFFICERS. — Supplementary to Regular Corps.—R.F.C.—Military Wing.—Sec. Lt. (on prob.) W. Simmonds relinquishes his commission on account of physical unfitness as a Pilot or Observer, Mar. 11th.

TERRITORIAL FORCE.—Infantry—Worcester R.—Sec. Lt. F. Cade is secd. for duty with the R.F.C., Jan. 31st.

Welsh R.—Sec. Lt. (temp. Lt.) J. R. Samuel is secd. for duty with R.F.C., Jan. 31st.

Notts and Derby R.—Sec. Lt. H. I. Newton is secd. for duty with the R.F.C., Feb. 2nd.

L. N. Lancs R.—Sec. Lt. E. Harling is secd. for duty with the R.F.C., Feb. 2nd.

Highland L.I.—Sec. Lt. (temp. Lt.) H. F. Duncan is secd. for duty with the R.F.C., Feb. 2nd.

Monmouthshire R.—Sec. Lt. (temp. Lt.) R. Rutherford is secd. for duty with the R.F.C., Feb. 2nd.

* * *

From the "London Gazette" Supplement, March 12th, 1917.

War Office, March 12th.

REGULAR FORCES. — Establishments. — R.F.C. — Mil. Wing.—Flt. Comdr.—Lt. G. C. O. Usborne, Canadian Mach. Gun Serv., from a Flying Officer, and to be temp. Capt. whilst so empld., Feb. 1st.

Depot Comdr.—Temp. Maj. F. R. G. Hoare, Army Ord. Dept., to be transfd. to Gen. List, and to be temp. Lt.-Col. whilst so empld., Jan. 1st.

Equipment Officers, 1st. Cl.—Temp. Lt. R. C. Lane, Gen. List, from Adjt., and to be temp. Capt. whilst so empld., Feb 15th

3rd Cl.—Lt. A. H. Fynn, S. Lan. R., T.F., and to be secd., Feb. 22nd.

* * *

The King has been pleased to approve of the appointment of the following Officer to be Companion of the Distinguished Service Order in recognition of his gallantry and devotion to duty in the Field:—

Lt. (temp. Capt.) Selden Herbert Long, M.C., Durh. L.I. and R.F.C.

For great skill and daring in piloting his machine. He shot down an enemy machine, which fell in our lines, and the same day he forced another hostile machine to land in the enemy's lines. Later, he shot down another enemy machine, which fell in our lines.

The King has been graciously pleased to award a Bar to the Military Cross to the following Officer:—

Temp. Lt. (temp. Capt.) William George Sellar Curphey, M.C., Gen. List and R.F.C.

He, with a patrol of four machines, attacked a hostile formation of ten machines. After a prolonged fight he drove one enemy machine down. Later, although wounded, he again led another attack on a hostile machine and succeeded in bringing it down. He has on many previous occasions done fine work. (M.C. was awarded in "Gazette" dated Nov. 14th, 1916.)

* * *

The King has been graciously pleased to confer the Military Cross on the following Officers in recognition of their gallantry and devotion to duty in the Field:—

Sec. Lt. Cecil Gordon-Davis, N. Staff. R. and R.F.C.

For conspicuous gallantry and devotion to duty. He brought

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down a hostile machine. Later, during the same flight, he attacked four enemv machines, split up their formation, and brought one of them down. He set a splendid example of courage and determination in the face of superior forces.

Capt. Robert Millington Knowles, Norf. R., Spec. Res., and R.F.C.

When acting as observer he showed throughout the greatest courage in the face of very superior forces, and a high standard of marksmanship.

Sec. Lt. James Thomas Byford McCudden, Gen. List and R.F.C.

He followed a hostile machine down to a height of 300 feet, and drove it to the ground. He has shown marked skill in many previous occasions, and has destroyed two hostile machines and driven another one down out of control.

The King has been pleased to award the Military Medal for Bravery in the Field to the following Non-commissioned Officers and Men:—

8575 1st Cl. Air Mech. A. Balfour, R.F.C.
15632 1st Cl. Air Mech. W. E. Perkins, R.F.C.
24981 Cpl. W. J. Perrott, R.F.C.
1145 Flt. Sgt. F. N. Sungsby, R.F.C.
18030 2nd Cl. Air Mech. H. T. Taylor, R.F.C.

The King has been pleased to award the Meritorious Service Medal to the following Non-commissioned Officers and Man, in recognition of valuable services rendered with the Armies in the Field during the present war:—

3450 Flt. Sgt. L. Frier, R.F.C.
106 Flt. Sgt. G. J. Langfield, R.F.C.
63 Flt. Sgt. A. E. Lewis, R.F.C.
11181 Cpl. R. R. Turner, R.F.C.
20943 1st Cl. Air Mech. T. P. Watson, R.F.C.

FROM THE COURT CIRCULAR.

Buckingham Palace, March 8th.

The following Officer had the honour of being received by the King, when His Majesty conferred upon him the Military Cross: Capt. Joseph Crook, R.F.C.

* * *

Buckingham Palace, March 10th.

The following officer had the honour of being received by the King, when His Majesty invested him with the Insignia of Companion of the Order into which he had been admitted:—

The Distinguished Service Order.

Major Thomas Cairns, Dragoon Guards and R.F.C.

The King then conferred decorations as follows:—

The Military Cross and Bar.

Capt. Alan Bell-Irving, Gordon Highlanders and R.F.C.

The Military Cross.

Lieut. Elmer Roberts, Royal Sussex Regt. and R.F.C.

NAVAL.

The following appointments have been made in the Royal Naval Air Service:—

March 7th.—Ldg. Mech.—J. E. Osborn, promoted to Wt. Officer (2nd grade), temp., seny. March 3rd, and apptd. to "President," addl., for R.N.A.S.

The following have been entered as Proby. Flt. Officers (temp.), seny. as stated, and all apptd. to "President," addl., for R.N.A.S.—W. H. Evans, Feb. 23rd; A. E. Dyer, and R. Brown, March 11th.

Temp. Commissions as Sub-Lts. (R.N.V.R.) have been granted to the undermentioned, seny. as follows, and all apptd. to "President," addl., for R.N.A.S.—G. A. Harrison, March 3rd; and W. B. Sinclair, March 6th.

March 9th.—The following have been entered as Proby. Flt. Officers (temp.), seny. March 11th:—J. R. Pattison, J. I. A. Rossington-Barnett, E. Morris, E. W. T. Fussell, E. Foster, J. M. Ogden, J. Durston, C. B. Cook, G. White, R. W. Helmsley, G. H. Barraclough, D. B. G. Francis, D. H. Carey, and C. E. Emerson.

Mr. W. J. Walker granted a temp. commission as Lt. (R.N.V.R.), seny. March 5th.

March 11th.—Flt. Lt. (temp.).—A. Brind, reapptd. as Actg. Flt. Comdr. (temp.), seny. March 8th.

Air Mech. (2nd Grade).—B. C. Bennett, promoted to Wt. Officer (2nd Grade), (temp.), seny. March 8th.

Mr. E. E. Hardie entered as Proby. Flt. Officer (temp.), seny. March 18th, and appointed to "President," addl., for R.N.A.S.

Mr. W. G. Everingham granted a temp. commission as Lt. (R.N.V.R.), seny. March 8th, and apptd. to "President," addl., for R.N.A.S.

Admiralty Communiqué.

March 6th.—On March 4th a raid was carried out by naval aeroplanes on the blast furnaces at Brebach. A large number of heavy bombs were dropped. All our machines and pilots returned safely.

The Casualty List.

Reported March 7th.

Wounded.—Powell, Flt. Sub-Lt. Leslie A., R.N.

Missing.—Portsmouth, R. S., Air Mech., 2nd Gde., F.7815.

Reported March 8th.

Previously reported Missing, now reported Prisoner.—Bysshe, Flt. Sub-Lt. Gordon T., R.N.

Previously reported as believed to be Prisoners, now Officially reported Prisoners.—Maitland-Heriot, Sub-Lt. Charles A., R.N.

Jameson, Sub-Lt. Wilfrid C., R.N.V.R.

Reported March 10th.

Died of Wounds.—Powell, Flt. Sub-Lt. Leslie A., R.N.

Missing.—Wambolt, Flt. Lt. Harry R., R.N.

White, Flt. Sub-Lt. James P., R.N.

Accidentally Injured.—Allen, Prob. Flt. Officer Leonard E., R.N.

Reported March 12th.

Missing.—Southron, Lt. Herbert G., R.N.V.R. (R.N.D., attd. R.F.C.).

Reported March 13th.

Missing.—Fox, Flt. Sub-Lt. John J. de la T., R.N.

PERSONAL NOTICES.

Deaths.

NORTHROP.—Flt. Sub-Lt. John Eric Northrop, R.N., was killed in an aeroplane accident on March 2nd. He was the husband of Tara Geraldine Northrop, and the second son of Mr. and Mrs. Alfred Northrop, of Blenheim Lawn, Manningham, Bradford. He was educated at Uppingham and Clare College, Cambridge, and was 22 years of age.

* * *

SNOW.—Midshipman Edward Rupert Snow, R.N., who was killed on active service on March 3rd, aged 18, was the eldest son of the late Col. E. B. Snow, R.M.L.I., and of Mrs. Snow. He was educated at the Royal Naval College, Osborne, passing into Dartmouth just before the war broke out. After one term there he was posted to the "Lord Nelson," and in addition to other service was present at both the evacuations of the Gallipoli Peninsula.

Then his great desire to fly led him off to offer himself for the R.N.A.S., in which he unfortunately met his death while flying.

He was a good all-round athlete, and at Osborne was in the elevens of his term. He was a true sailor and keen on his profession, and his popularity at school and Osborne followed him into the Navy. His father served in the Baltic 1857 and 1858, and was specially promoted by an Order in Council for services during the visit of the late King Edward, when Prince of Wales, to India, on which occasion Col. Snow commanded the Royal Marines forming the guard of honour on H.M.S. "Serapis."

Birth.

HALLIFAX.—On March 9th, at Hansord, Penzance, the wife of Flight Commander E. de Courcy Hallifax, R.N., of a son.

A postcard has been received by Mr Clifford B. Prodger from Flt. Sub-Lt. G. K. Blandy, R.N., who is a prisoner in the hands of the Bulgarians. This postcard is not without interest as it indicates that the chivalry of the German pilots on the Western front has been emulated by those who have been lent to the Bulgarians. To assist the Bulgarian Censorship Flt. Sub-Lt. Blandy has written in French, the translation of which is as follows:—

"Perhaps you already know that I have been taken prisoner by the Bulgarians. I was Fokkered and slightly wounded (my engine was considerably damaged). I am still in hospital at Drama, but I am going to Philippopolis in a few days as soon as I am better. I am getting along quite well and everyone is very kind to me and I am well looked after. The German aviator who brought me down often brings me papers, cigarettes, etc."

MILITARY.

G.H.Q. Communiqués.

March 7th, 8.20 p.m.—On the 6th there was considerable aerial activity. A great deal of successful reconnaissance, photography, and artillery work was done by our machines, and valuable information was obtained. Many bombs were dropped on the enemy's billets and dumps. The enemy made a determined, but unsuccessful, effort to stop our work, sending up a very large number of machines.

Much aerial fighting took place all along the front throughout the day, during which three hostile machines were brought down, and at least three others driven down damaged. Four of our machines were brought down and seven others are missing.

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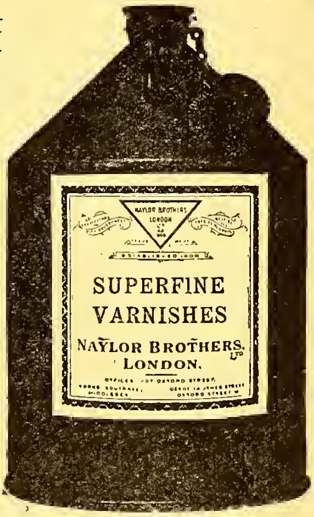

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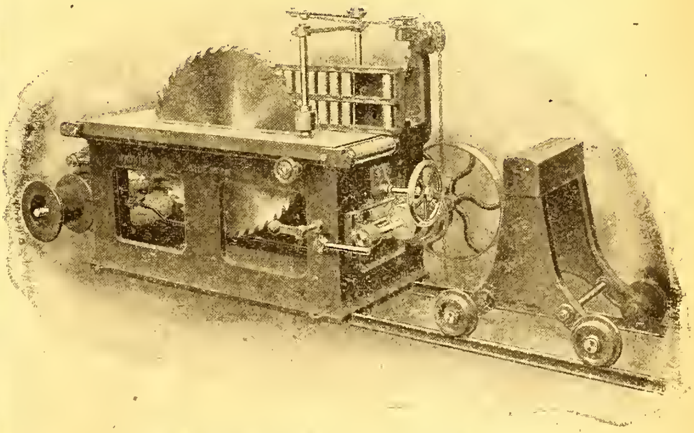

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March 10th, 9.15 p.m.—Yesterday an aerial patrol of our machines was heavily engaged by a strong hostile formation. During the day four of our aeroplanes failed to return. One of the enemy's machines is known to have been brought down.

March 12th, 8.35 p.m.—There was considerable aerial activity yesterday, and much successful bombing and reconnaissance work was carried out by our aeroplanes.

Air fighting was continuous. Nine enemy machines were brought down or driven down damaged, four of which are known to have been destroyed. Five of our machines are missing.

War Office Communiqué.

The General Officer commanding the British Forces in Egypt reports:—

March 6th.—On March 6th our aircraft carried out a series of bombing attacks on enemy troops, railway trains, rolling stock, and permanent way. About a ton of high explosive was dropped and much damage caused to personnel and material.

The Casualty List.

Reported March 7th.

Killed.—Johnson, Sec. Lt. H. A., R.F.C.
McArthur, Capt. J., R.F.C.
MacKain, Sec. Lt. H. F., R.F.C.
Pope, Sec. Lt. E. A., R.F.C.
Vaughan-Jones, Lt. G., R.E. and R.F.C.

Accidentally Killed.—Bayley, Sec. Lt. E. V., S. Staffs R. and R.F.C.

Wounded.—Nickalls, Lt. H. G., Yeomanry and R.F.C.

Died.—R.F.C.—Heyworth, 47876 2nd Cl. Air Mech. J. E. (Bramhall); Young, 50027 2nd Cl. Air Mech. H. (Lyndhurst).

Wounded.—R.F.C.—Cottingham, 3232 1st Cl. Air Mech. H. L. (Middle Rasen).

Reported March 8th.

Wounded.—Howes, Sec. Lt. E. McM., R.F.C.

Reported March 9th.

Wounded.—Gabell, Sec. Lt. D. R. C., Gloucester Regt., attd. R.F.C.
Simpson, Lt. G. K., R.F.C.

Killed.—R.F.C.—Knightley, 450/1 2nd Cl. Air Mech. P. E. (Shoreditch, E.).

Previously Missing, now reported Died as Prisoner in German Hands.—R.F.C.—Jones, 35214 Sergt. T. (Walton-le-Dale).

Reported March 10th.

Wounded.—Scrase-Dickins, Sec. Lt. A. R. M., K.R.R.C. and R.F.C.

Missing.—Craves, Sec. Lt. C. .S, R.F.C.

Previously reported Missing, now reported Prisoner in German Hands.—Woods, Sec. Lt. M. E., R.F.C

Correction.—Pearson, Sec. Lt. W. J., R.A.M.C., attd. R.F.C. (reported wounded), should read :—Pearson, Sec. Lt. W. J., R.F.C.

Reported March 12th.

Killed.—Bowling, Sec. Lt. V. M., R.F.C.
Harms, Sec. Lt. W., North'd Fus., attd. R.F.C.
Hill, Sec. Lt. B. W., R.F.C.
Horn, Sec. Lt. E. E., Midd'x R., attd. R.F.C.

Previously reported Missing, believed Killed, now reported Killed.—Pulleyn, Sec. Lt. J. L., Dorset R., attd. R.F.C.

Died of Wounds.—Morgan, Sec. Lt. B. A., R.F.A., attd R.F.C.

Wounded.—Fletcher, Capt. E., A.S.C. and R.F.C.
Golding, Sec. Lt. W. A., R.F.C.
Lambourne, Lt. H., R.F.C.
Scoles, Lt. R. W., R.F.C.

Missing.—Fenton, Sec. Lt. A. H., R.F.C.
Green, Sec. Lt. H. J., R.F.C.
Lees, Capt. A., R. West Kent R., attd. R.F.C.
Reid, Sec. Lt. A. W., King's Own Sco. Bord., attd. R.F.C.
Wood, Sec. Lt. P. L., R.F.C.

Missing, believed Prisoner in Turkish Hands.—Lazarus-Barlow, Lt. A. J., Yeo. and R.F.C.

Reported March 13th.

Died of Wounds.—Steuart, Sec. Lt. W. W., High'd L.I., attd. R.F.C.
Reeve, Sec. Lt. F. H. E., North'd Fus., attd. R.F.C.

Died.—R.F.C.—Moody, 993 Cpl. A. (London, N.W.).

PERSONAL NOTICES.

Deaths.

BLACK.—Major Maurice Adam Black, Dragoon Guards, attached R.F.C., previously officially reported "missing, believed killed," now unofficially reported killed on Feb. 11th, during an air fight, was the elder son of the late Adam William Black, of Edinburgh, and Mrs. Black, of Aston Park, Wem, Shropshire. Born in 1876, he was educated at Cargilfield, Rugby, and Christ's College, Cambridge. He received his commission in the 5th Dragoon Guards in 1899, serving for two years in South Africa, where he received the Queen's and King's medals with five clasps.

In October, 1914, he was severely wounded in France, and was unable to rejoin his regiment till August, 1915, but in two months' time he was invalided home again through complications of his old wound. Finding himself incapacitated from again serving with his regiment in an active capacity, he joined the R.F.C., soon gaining his "wings." He went to France, and was shortly promoted Flight Commander, and went to another front last September.

Major Black was a splendid all-round athlete and sportsman, representing Cambridge at Rugby football in 1897-8, and afterwards he played for his regiment in all inter-regimental polo tournaments. He was a keen big-game shot and cross-country rider, winning many point-to-point races and the Army "Point-to-Point" run near Rugby in 1914. He married in 1903 Ethel Maude Goldney, younger daughter of Mr. George Goldney, of Chippenham House, Exmouth, Devon, and leaves a daughter.

* * *

GRAVES.—Major Evelyn Paget Graves, R.F.C., and Capt., R.F.A. (killed in an air fight on March 6th), was 26 years of age and the eldest son of Major the Hon. A. E. P. Graves, of Queen Anne's Mansions. Major Graves passed out of Woolwich into the Royal Artillery in December, 1910, and had promotion in December, 1913. He entered the R.F.C. in October, 1914, and in June of last year was graded squadron commander.

* * *

GREEN.—Lt. Thomas Seaman Green, R.F.C., whose death was reported last week, was 22 years of age. He was educated at King William's College, Isle of Man, and on the outbreak of war enlisted in the 5th North Staffordshire Regiment and was granted a commission in another battalion of the same regiment in December, 1914, being transferred to the R.F.C. in January, 1916. He had been serving as a pilot at the front since June, and for the last few weeks had been acting flight commander.

Mr. Green was the officer who was deputed to carry over and drop a wreath to the memory of the late Capt. Bölcke, the famous German aviator.

His senior officer writes :—"Your son was loved by us all and his death has left a gap in our mess which can never be filled. His courage was magnificent, and it is impossible to estimate too highly his splendid work out here. His death was just as magnificent, and it was brought about while engaging Hun machines in considerably superior numbers. His greatest joy was a fight with enemy machines. I say with absolute sincerity that I have never met anyone out here possessing greater courage. It was an honour indeed to command such a son as yours."

* * *

HILL.—Lt. Beresford Winnington Hill, R.F.C., who was killed on March 4th, was the only son of Thomas Hill, of East View, Uxbridge (formerly of Parkside, Ewell). Born in 1892, he was educated at Mr. Worsley's, Evelyns, Hillingdon, and at Malvern College, where he held a classical scholarship. On leaving Malvern he was given a leaving scholarship, and he also won an open classical scholarship at Magdalene College, Cambridge, and went up in Oct., 1911, taking his degree in 1914. He served in the Cambridge O.T.C. for three years, and on the outbreak of war was given a commission in the Rifle Brigade. He went to the front in July, 1915, and was wounded in October, 1915. On his recovery he entered the R.F.C. in April, 1916, and returned to the front as a pilot last February.

* * *

HILLS.—Lieut. William Frederick Waller Hills, R.F.C. (killed in action on March 6th), was the elder son of Colonel E. H. Hills, C.M.G., F.R.S., and of Mrs. Hills, 1, Campden Hill. Born in 1893, he was educated at Horris Hill and Eton, and at the outbreak of war he had just completed his second year as an undergraduate at Trinity College, Cambridge. He obtained a commission as Sec. Lt. in the R.F.A., and was a member of the first Salonika Expeditionary Force, taking part in the advance into Serbia.

He returned to England in May, 1916, in order to join the R.F.C. Immediately on completion of his training he was appointed instructor, and after a short period joined a service squadron and went to the front in January last.

Mr. Hills married in October, 1914, Agnes, daughter of the late the Hon. Walter Sugden and of Lady Agnes Sugden, and leaves an infant son. His younger brother, Sec. Lieut. Charles Herbert Hills, the Manchester Regt., was killed on the Somme front last September.

* * *

LASCELLES.—Lieut. Harold Leslie Lascelles, R.F.C., was killed in a flying accident on March 11th. He was the son of Mrs. Lascelles O'Connell, of Way Home, West Byfleet.

* * *

SPENDLOVE.—William Charles Spendlove, R.F.C., who died on Feb. 27th at Bermondsey Military Hospital, was the husband of Jane Spendlove, late of 24, Duke Street, Manchester Square, W. He was 40 years of age. The funeral took place at Nunhead Cemetery on Mar. 3rd.

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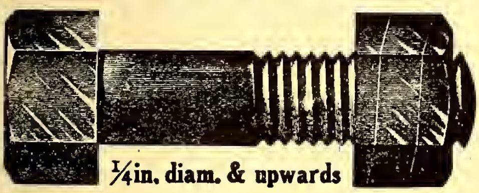

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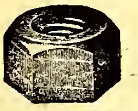

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STROFF and GILES.—Lt. Stroff, R.F.C., and 2nd Cl. Air Mech. Giles were killed in a flying accident in Warwickshire on March 12th. They ascended from an aerodrome, and when at an altitude of 200 feet something went wrong with the machine, which dived to earth. The aeroplane caught fire.

* * *

WHITE.—Sec. Lt. Harold Tom White, attached R.F.C., whose death was announced last week, joined the Hampshire Fortress Engineers in October, 1914. He received a commission in the same unit in March, 1915, and was attached to the R.F.C. in August, 1916. He was the only son of Engineer Captain White, Royal Indian Marine, and of Mrs. White, of Lovedale, India.

Marriages.

CHADWICK—RUSSELL.—On March 10th, at St. Augustine's Church, Queen's Gate, by the Rev. C. L. Ridgway, Temp. Major R. Chadwick, M.C., R.F.C., second son of Mr. and Mrs. William Chadwick, Brooklands, Manchester, was married to Ruth, elder daughter of Mr. and Mrs. Stanley Russell, Birkdale.

* * *

ERSKINE—HIGGINS.—On March 9th, at St. Columba's Church, Pont Street, by the Rev. J. C. Higgins, B.D., uncle of the bride, Ralph Erskine, Lieut., R.F.C., was married to Jane Lennox, only daughter of Mr. and Mrs. William Higgins, Glenafton, Wimbledon.

Engagements.

BUSH—BOURNE.—The marriage between Paul Francis Wheler Bush, Lt., R.F.C., eldest son of the late Robert Francis Evans Bush, of Oakfield, Rugby, and Kathleen, youngest daughter of the late Wykeham Bourne and Mrs. Bourne, of 53, Oxford Gardens, W., will take place on Thursday, 29th inst., at 11 o'clock, at St. Stephen's Church, Westbourne Park.

* * *

ROBINSON—WHIPPLE.—The engagement is announced of Capt. W. Leefe Robinson, V.C., Worcester Regiment, attached R.F.C., son of Mr. Horace Robinson, Pollibetta, India, to Joan Uppleby, widow of Capt. H. C. Whipple, Devonshire Regiment, and daughter of Gerald Stapylton-Smith, Hutton, Essex.

Births.

CORBALLIS.—On March 3rd, at 26, Royal Crescent, Bath, the wife of Captain E. R. L. Corballis, Royal Dublin Fusiliers and R.F.C.—a daughter.

* * *

ECHLIN.—On March 5th, at 5, Brock Terrace, Guernsey, C.I., the wife of Lt. Frederic St. J. F. N. Echlin, Royal Fusiliers and R.F.C., killed in action September, 1916—a daughter.

* * *

VINCENT.—On March 10th, at The Coppice, Hatch End, Middlesex, the wife of Sec. Lt. C. H Vincent, R.F.C., of twins, son and daughter.

A letter has been sent to the widow of Lt. Matthews, R.F.C., killed at Salonika, enclosing the following copy of a message dropped from a German aeroplane on a British aerodrome:—

> The English aviators had been fighting very bravely, but after five minutes their aeroplane dropped and they were killed. They died heroes. Their bodies will be buried with all military honours.

FRANCE.

Official Communiqués.

March 6th.—During the daytime of March 4th a group of machines of the British Naval Air Service bombarded the railway stations at Brebach (south-east of Saarbrücken) and St. Avold (south-west of Saarbrücken). Forty bombs were dropped, most of which reached their mark.

It is confirmed that one of our pilots brought down a German machine on March 4th in the region of Ornes (Verdun front).

On the night of March 4th-5th our aviators dropped bombs on the railway station and military establishments of Freiburg-in-Breisgau (south of Strassburg) and on the mills at Kehl (a short distance east of Strassburg). Last night one of our air squadrons dropped 3,130 kilogrammes (over three tons) of bombs on the aerodrome of Varennes (Oise), the sheds of which were seriously damaged.

March 7th.—On March 4th Adjudant Casale brought down his sixth enemy aeroplane. The machine came to the ground in the region of Dieppe (north-east of Verdun).

Yesterday Lt. Piusard attacked at close quarters a "Rumpler" and brought it down in the lines north of Laval. This is the fifth enemy aeroplane for which this pilot has accounted.

March 10th.—A German aeroplane was brought down by the fire of our anti-aircraft guns in the region of St. Mihiel.

March 11th.—It is confirmed that a German aeroplane was brought down in an aerial fight on March 4th. The enemy machine fell in the neighbourhood of Roye.

Last night a German aeroplane threw bombs on Belfort, but caused neither casualties nor damage.

One of the best known pilots of the pre-war days, M. le Comte de Lareinty-Tholozan, afterwards Capitaine in the Service d'Aviation Militaire, after numerous flights over the enemy lines has been killed in an aerodrome smash of an apparently trivial nature on a Nieuport biplane.

The late Comte was one of the small band of French sportsmen who instituted aerial touring in France. He won the Legion of Honour on service in Morocco before the war, and afterwards busied himself in piling up palms on his Croix de Guerre, doing fine work on an "Avion de Chasse," and acting as an escort to machines on reconnaissance.

The fatal accident occurred at the commencement of a flight when he elevated sharply to avoid a collision, apparently stalling his machine and hitting the ground violently, without seriously smashing his machine. All who knew him will regret the loss of a fine sportsman and a gallant officer.

GERMANY.

Official Communiqués.

March 7th.—Clear weather favoured aviators in the fulfilment of their tasks.

In numerous air engagements 15 enemy aeroplanes were brought down.

We lost one machine owing to the enemy's action.

March 8th.—Between Vileika and Molodetchno (a Russian railway junction south-east of Vilna) a Russian train was derailed by the dropping of bombs.

March 9th.—During the month of February we lost 24 aeroplanes. Our enemies in the West, the East, and in the Balkans lost 91 machines, of which 37 are in our possession. Forty-nine were seen to fall behind the enemy's lines, and five machines were forced to land.

March 10th.—Our aviators shot down six enemy aeroplanes and two captive balloons, and as the result of our anti-aircraft fire one enemy machine crashed to earth. Lt. Baron von Richthofen in an aerial engagement brought down his 25th hostile machine.

March 12th.—The enemy lost, by means of aerial attacks, 16 aeroplanes and two captive balloons, and by means of anti-aircraft fire, one aeroplane.

In consequence of very clear visibility, long-range artillery and aircraft displayed increased activity at many points.

* * *

The funeral of Count Zeppelin took place on March 12th at Stuttgart. Many years ago the Count erected his own grave vault at Prag Cemetery, Stuttgart, hence the Countess declined the offer to give the deceased Count a tomb in the Royal Cemetery, which was recently made to her by the King of Wurtemberg. The King was present at the funeral, the ceremony of which was very short, owing to the ill-health of the Countess. It consisted of a sermon from the Bishop of Stuttgart, and prayers.

The Kaiser commanded General von Hoeppner, Commander-in-Chief of the German air forces, to attend the obsequies. Thousands of Zeppelin workmen from Friedrichshafen arrived by special train, and there were hundreds of wreaths.

The late Count Zeppelin has left to the German Government the rights in all his scientific discoveries and patents.

* * *

It is semi-officially declared from Berlin that the building of Zeppelins, instead of being suspended as was recently reported, is being continued on the same scale as before.

* * *

Herr Hans Vollmöller, the famous German pilot and engineer, has been mortally injured by a fall whilst making a trial flight. He constructed an aeroplane of his own in 1910, and has consistently taken part in German aviation competitions ever since. Herr Vollmöller will be remembered by many of the older Brooklands hands as a visitor not long before the war. He was singularly un-German in manner and appearance, and looked more like an English public-school boy than anything else. He was a highly skilled pilot and was esteemed by all who knew him as an earnest seeker after aeronautical truth.

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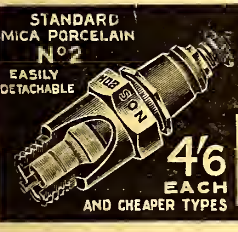
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RUSSIA.

Official Communiqués.

March 6th.— On March 4th one of our airships, notwithstanding the attacks by German battleplanes, made a flight over Baranovitchi (an important junction near the Russian centre), dropping some bombs.

In the neighbourhood of Volchetsk Station (Sarny-Kovel Railway) (and about 20 miles behind the Russian front) a German aeroplane was brought down by our aviator, Sub-Lt. Andreef. The enemy machine caught fire, and the aviators were taken prisoners.

March 9th.—Aviation.—A squadron of our aeroplanes made a flight over the station of Soly (south-east of Vilna), dropping some bombs.

March 11th.—In the direction of Swentsiany our aeroplanes raided the railway stations of Barany-Rog (north-west of Lake Narotch) and of Goduniki, upon which bombs were dropped.

March 12th.—In the Riga region the aviator, Non-Commissioned Officer Maklapu, brought down a German aeroplane, and took the occupants, who were wounded, prisoners.

AUSTRIA.

Official Communiqué.

March 10th.—Near Gorizia a Caproni aeroplane was shot down by our artillery and fell near St. Andrea.

ITALY.

Official Communiqués.

March 11th.—The weather being favourable there was considerable aircraft activity, and aerial bombardments took place on both sides. We suffered no damage.

During the evening some of our aeroplanes dropped bombs on the valley of Muggia (south of Trieste) and on the dockyards at San Rocco (west of Muggia), and Santa Sabba, on the Bay of Muggia. Conflagrations were observed at various places.

On March 11th, M. Corsi, the Minister of Marine, pointed out the effectiveness of patrols of airships and aeroplanes against submarine attacks.

TURKEY.

Official Communiqués.

March 7th.—An enemy aeroplane squadron made a bomb attack on the station of Tel-el-Cheria, but did not succeed in doing any damage.

Our anti-aircraft guns brought down an enemy aeroplane, the pilot and observer of which were made prisoners

March 11th.—Sinai Front.—A British aeroplane was brought down, and the observer, an Australian officer, taken prisoner. The machine, which was but slightly damaged, is in our possession.

BULGARIA.

Official Communiqué.

March 10th.—In the valley of the Vardar and along the Orfano coast there was aeroplane activity.

On the whole front (on the Danube) between Galatz and Sulina there was aerial activity on both sides. We brought down by artillery fire an enemy aeroplane, which fell in flames on the left bank of the St. George's arm of the Danube north-east of Tultcha.

GREECE.

It was reported that a German aeroplane squadron made another raid on Salonika early on March 5th. Bombs were dropped near the general hospitals outside the town. Fortunately there were not many patients there.

Three of the bombs dropped almost hit a huge flag spread on the ground as an indication to aviators of the nature of the camp.

Noee of the hospital staff was injured, although some had marvellously narrow escapes.

The raiders, who were heavily shelled, finally made off in a north-westerly direction.

This was the first bombing raid for 10 months, and it seems likely that the recent visits of isolated enemy aviators—who, though bombarded and pursued, circled over the camps without attempting any harm—were for the purpose of making photographs for use in raids on a larger scale like that of to-day.

The material damage seems not to amount to more than one motor-lorry burned, and the raiders paid the toll of their exploit, one of their machines being brought down by an Allied aviator at Gumendje on the way back to the frontier. The German officer piloting it was taken prisoner.

BELGIUM.

It was reported from The Hague on Feb. 27th that Zeebrugge was heavily bombarded again the day before by a large number of Allied aeroplanes, which dropped more than 50 bombs on the harbour and neighbouring munitions depots. There was also an attack by seaplanes from the sea, and the reports of the bombardment were heard at Flushing.

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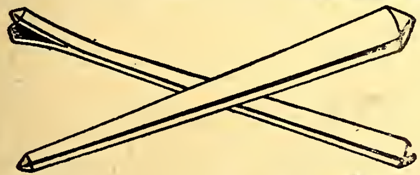

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Vol XII. No. 12

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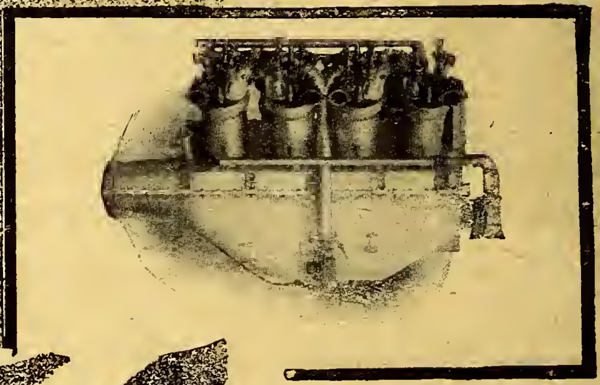

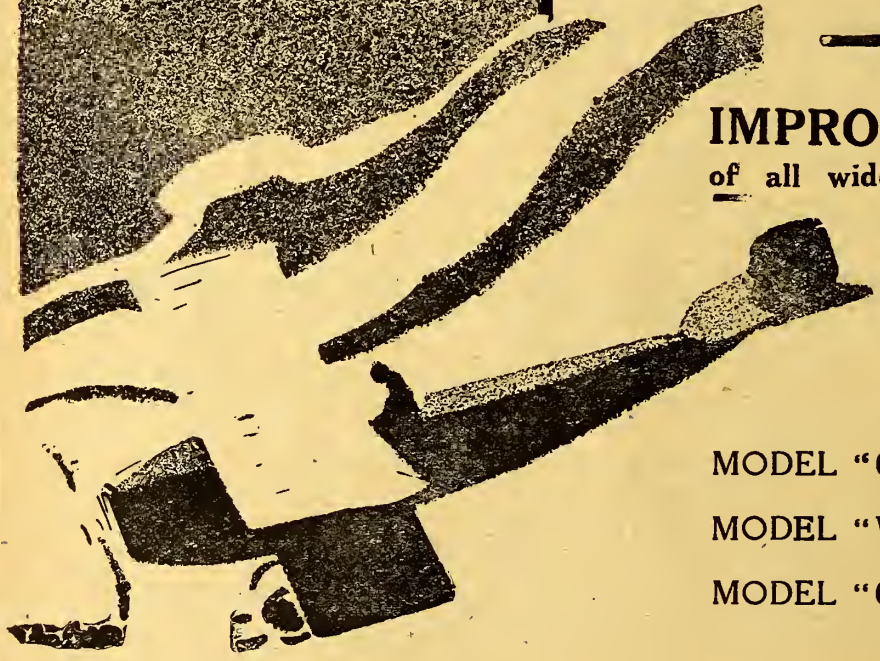

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ON THE NEW AGITATION.

For some weeks past there have been signs of a renewal of the agitation of a year ago concerning the state of our aerial forces, particularly with reference to the Western Front. Veiled references in the daily Press and less veiled questions in Parliament have indicated a state of uneasiness among those at home who are in touch with active-service aviation. And various people intimately concerned with the welfare of the Flying Services have inquired somewhat reproachfully why this paper has remained quiet on the subject for so long, in view of the facts known to all who are concerned with aircraft.

On the last point perhaps I may explain that, as an exceedingly peaceable person, who cordially dislikes being unpleasant except under stress of circumstances and in the interests of others, I have purposely abstained from stirring up trouble, my object being to assist as far as was in my power in giving the Air Board a fair chance of putting right the mistakes of its predecessors—or perhaps one should say its forerunners, seeing that the party responsible for those mistakes has not predeceased it, and is at the moment far from being deceased in any way. That being so, it seemed wiser to say nothing till absolutely forced to do so, as now appears to be the case in the interests of the R.F.C. and of the future reputation of the Air Board.

A Fair Warning.

Nevertheless, it is well to recall that four months ago precisely, on November 22nd, 1916, to be exact, in an article entitled "A Fair Warning" I pointed out that the history of the later months of 1915 seemed to be unpleasantly likely to repeat itself. In that article it was stated that just as the Fokker monoplanes of 1915 used to sit up at 10,000 to 12,000 feet and dive onto the B.Es. of that day, which seldom exceeded 7,000 or 8,000 feet, so in September, October, and November of 1916 the Halberstadts, L.V.Gs., and what our people called the German Spads (now known to be the D.1 Type Albatros, which is described in detail in *Aeronautical Engineering* this week), cruise round at anything between 17,000 and 20,000 feet and dive onto such of our machines as cannot exceed 12,000 to 15,000 feet.

Further I said: "The pilots of the R.F.C. know better than anyone how many of our machines can reach 20,000 feet with present engines tuned by average R.F.C. mechanics. And next to them the Germans know best, from experience."

It was also stated that we had then, in this country, machines able to beat the Germans' best, and that machines were then (four months ago) on order which would have been valuable nine or ten months before that, but were now unable to beat the Germans.

Since then we have learned a good deal more about the German machines. The Halberstadt and L.V.G. are found to be less dangerous than was thought, though still good enough to trouble the ordinary reconnaissance machine. The D.1 Albatros is apparently the fastest German destroyer. The new Fokker biplane illustrated and described recently, and fitted apparently with a monosoupape, or single-valve, Uberursel engine, is about the next best, and the Ago and L.F.G.-Roland biplanes come near it in importance. But even without this later knowledge it cannot be charged against this paper that it failed to give fair warning of what we might expect.

Some Recommendations.

In that same article it was recommended that contracts for machines which were obsolescent for war purposes should be cancelled and replaced by orders for the types known to be better than those of the enemy, and that material actually in hand should be built up into school machines only. Also, it was recommended that, instead of waiting for drawings of the superior types, in the old-fashioned way, contractors should be given actual machines to copy.

As a proof of the sense of this latter recommendation, one can point to a certain firm which produced recently a copy of a new type of machine within seven weeks of the sample being delivered, which was probably less time than would have been taken to get the drawings through in the old way. Other recommendations in that article have also been put into effect. I definitely disclaim any credit for that fact, the change in method being probably due to people either in the Services or in the Aircraft Industry whose suggestions reached the authorities by one channel and reached me by another.

Finally it was stated that "we can keep our command (of the air) if the really capable officers in both the Flying Services are adequately supported by the Government, and if the incompetents are deprived of their power for harm."

Expecting Too Much.

It was perhaps too much to expect that in four months the mistakes of seven years could be wiped out, or even that the mistakes of the first two years of war could be put right in such a space of time. But it does certainly appear as if the capable officers with active-service experience have more say in affairs than they had, although one would hesitate to state that those who were responsible for all the early troubles are as yet incapacitated.

For instance, one hears of high-speed destroyers, strongly advocated by officers of experience, being turned down without orders. Possibly this may be from humane motives, on the grounds that pilots might be killed in learning to land them, but, even so, it is arguable that, if their terrific speed enables them to kill many Huns and to save many pilots and passengers of reconnaissance, spotting, and bombing machines from being brought down, they may be allowed a few victims themselves. And, anyhow, such machines would only be manned by special volunteers.

In any case there is no excuse for continuing to order slow low-powered B.E.2s (whether B.E.2cs, or B.E.2xs, ys, or zs, does not matter much) from firms whose previous record for high-class work has proved their fitness to be entrusted with the manufacture of the highest class of war aeroplane.

USELESS IMPROVEMENT.

Doubtless the B.E.2 of the later literations is an improvement on the B.E.2c which fell so easy a prey to the Fokker monoplane. And doubtless the R.A.F. engine of to-day is an improvement on the 1915 R.A.F. Either improvement does not suggest insuperable difficulties. But one can flatten wings, and add surface, and increase lubrication, and induce cooling to an extraordinary extent without producing a machine which with a problematic 90 h.p. is able to put up a show against the 160 h.p. to 170 h.p. which is obtained on actual test from practically every German engine now in use with fixed cylinders, or against the full 90 h.p. of the ordinary nine-cylinder Uberursel, let alone whatever more can be got out of the single-valve type.

The point to be considered is whether those who have spent the past twelve months in trying to justify the existence of the B.E.2 series by a prolonged process of laborious improvement have done their duty by the Services.

It would obviously have been simple to have produced in three months or so a machine with a better performance than the big L.V.Gs., Rumplers, and C.III type Albatroses, with engines of 160 to 200 h.p. Such engines, and better, exist in this country, and they could have been made in quantities by those firms which during the past twelve months have been wasting man-power and material in turning out 90-h.p. R.A.F. engines.

THE AIR BOARD'S OPPORTUNITY.

It must be clearly understood that no blame can possibly attach to the present Air Board as such for these errors of judgment, and it seems equally clear that the new agitation arises entirely from errors committed before the Board came into existence. It is somewhat late in the day, but the Air Board still has a great opportunity for good, in that it can wipe out the machines and engines which have given rise to the new agitation, and with them can remove the people who have given rise to the machines—or perhaps one would be more correct in describing them as the people who have failed to make the machines rise.

A MATTER OF POLICY.

Possibly a number of obsolescent machines may have been retained on active service during the past winter, while a big supply of much better machines was being built up at home, so that they can be brought into action suddenly at the right moment. Such a course would be distinctly preferable to sending new machines over in ones or twos, and risking the falling into the hands of the enemy of the early examples, as has happened before now. And such a course would be justifiable on the plea of military expediency, even at the cost of a number of aviators, severe though the policy might seem to the aviators concerned.

Army reconnaissance and artillery spotting must be done with whatever material is available, and the reconnaissance and spotting machines must be protected by whatever fighting machines are to be had, even if inferior to enemy destroyers. The Commander in the Field must carry on with what he can get, and trust to his own tactical ingenuity to make up for lack of quantity or quality of matériel. In this respect the General Officer Commanding the R.F.C. at the Front has been highly successful. He has been ably supported by the ability of his subordinate commanders and by the gallantry and skill of his pilots, observers, and gunners.

The supply of pilots and trained observers and gunners has been maintained with equal ability from home, thanks to the excellent system of air organisation evolved. Training of all kinds has been developed to an extraordinary degree in navigation, aerobatics, air fighting, bombing, gunnery, photography, and in everything else likely to produce efficiency.

Naturally one could find defects or reasonable grounds for criticism if one tried hard, and individuals may have cause for complaint of their treatment by superior officers, for no system on earth is perfect, but on the whole no reasonable person could find much ground for agitation about questions of personnel.

THE REAL TROUBLE.

The legitimate cause of complaint is that, though the use of obsolescent machines on active service at certain stages of war is perfectly justifiable and above criticism as a matter of policy, there is no justification for such machines being so far out of date as they appear to be.

If our Supply Departments had displayed greater foresight, even at the date of the last agitation in March of 1916, machines which are still on order would now be seeing their last days of service on the West Front, and the types which are the cause of the present agitation would have been deleted something like a year ago.

Those who are concerned with the present agitation have two fair charges which they can make. Either those responsible for Supplies in the past have shown lack of foresight, or they have allowed themselves to be unduly influenced by those personally interested in perpetuating official designs of aeroplanes and engines, to the detriment of better designs by other people.

Any agitation limited strictly to those grounds must succeed if the Government permits another inquiry to be held, and if the Committee of Inquiry is given the power to subpœna witnesses, for an examination of the dates on which new types have been submitted, the dates on which they have been approved and ordered, the dates on which they have been delivered, and the dates on which they have been put into use, would be enough to damn any administration for all eternity. What can one say when a type is submitted in July, 1915, approved in December, 1915, ordered in small quantities in March or April of 1916, delivered largely in November of 1916, and kept in use when already obsolescent in March, 1917? And there are others.

THE PLAIN FACTS.

Whether lack of foresight, or the desire for personal prestige, or ignorance of technical requirements, or inability to organise output to the best advantage, or professional jealousy, or a determination to uphold official designs against the obvious superiority of "trade" designers, be the cause of the trouble matters but little. The clear outstanding facts are as follows :—

(a) Machines and engines are in use on active service to-day which ought to have b[illegible] relegated to school use at least a year ago.

(b) Factories are still turning out such machines and engines when they might be fully occupied on modern machines.

(c) Factories are still at work on orders, partially delivered, and in some cases not even begun, for machines which ought to be on the point of going out of use.

(d) Delivery of newer machines of types superior to those used by the enemy are thereby delayed.

So far as we can gather, the same people who were the cause of the criticisms made against the administration of the R.F.C. last year—charges which were confirmed in the most polite manner possible by the Air Inquiry Committee—are responsible for the state of affairs which has produced the new agitation of to-day.

NECESSARY REMOVALS.

It is necessary for the welfare of the Flying Services that those who have produced this state of affairs be removed from office, and that they be replaced by capable men whose first consideration is the good of the Services.

If those who propose to conduct the new agitation will adhere strictly to demonstrable facts, and will studiously avoid side issues, there is every prospect of the agitation succeeding, and producing results of high value to the Flying Services.

The daily Press is fond of informing us that what it is pleased to term "The Old Gang" in Parliament has been removed from office. It has lately chronicled the removal of "The Old Gang" from power in Russia. Changes in the command of the French, Russian, Italian, and British Armies abroad have been followed by improved results. The French *Service d'Aviation* has had its third "crisis" recently, and is in process of improvement—an improvement which was apparently as necessary as in our own Service. It seems, therefore, that an appropriate time has arrived for a similar change in the British Flying Services.

The appointment of the Air Board, as at present composed, has only carried out half a reform. The other half of the reform is still more greatly needed. The "Old Gang" still has to be removed.—C. G. G.

AIRCRAFT AGITATION IN THE HOUSE.

The real beginning of the New Agitation was marked by the statement of Mr. Macpherson, Under Secretary of State for War, that he *thought* he could assure Sir Henry Dalziel that the R.F.C. maintained its mastery in the air, the statement being received with cries indicating doubt.

On March 13th **Sir Henry Dalziel** asked the Under Secretary of State for War whether he was able to give the House the evidence on which his statement that we still maintain the mastery of the air on the Western front is based; whether he can state the average number of casualties per week during the last six weeks; and can he also state whether the War Office are in every respect satisfied with the machine that is at present being employed?

Mr. Macpherson: I will reply to the last two parts of my right hon. friend's question first.

The average casualties per week for the last six weeks are:—

Killed	7.6
Wounded	8.3
Missing	4.2

The War Office is satisfied for the moment with the best types which are being employed. But there are machines still in use, of types which are not up to the latest standard. These are being replaced as rapidly as possible.

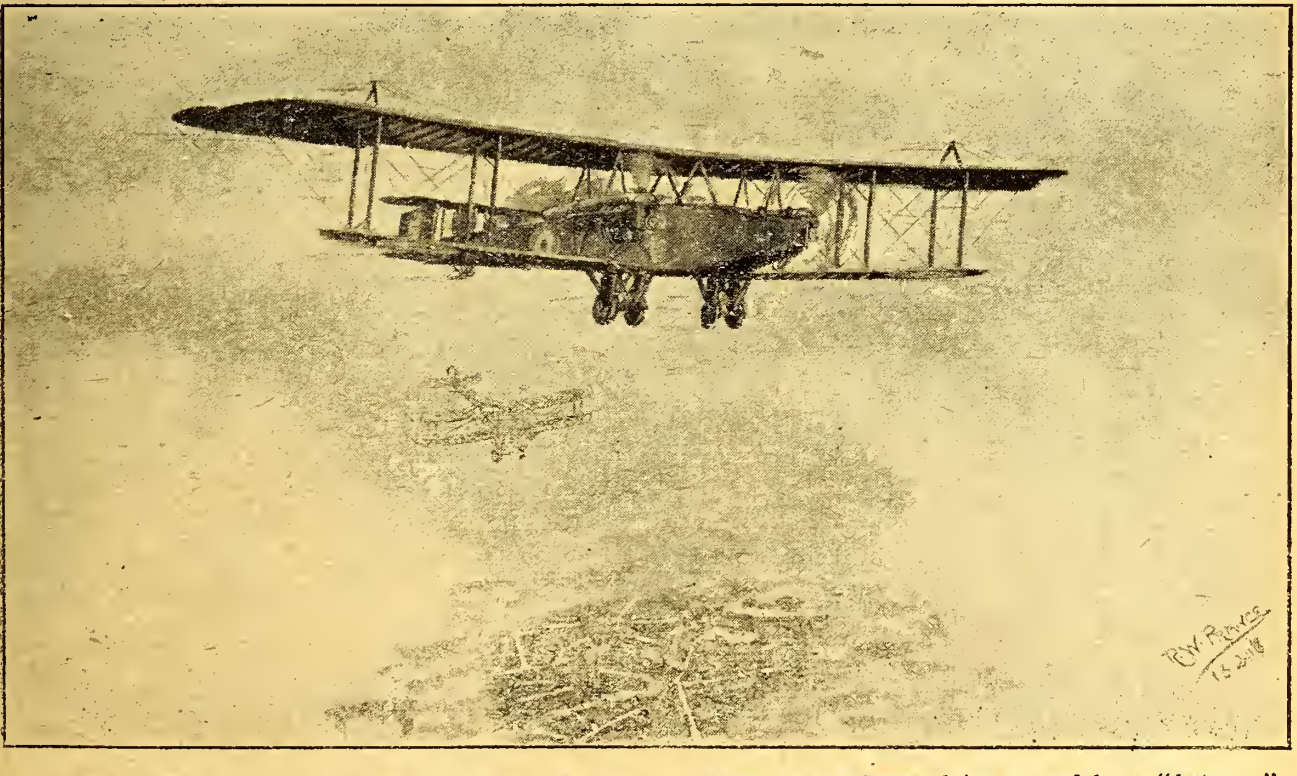
As regards the first and main part of the question, the situation in the air on the British front in France at the present moment is undecided. During the winter months, when flying is much interfered with by short days and bad weather, all the belligerents have endeavoured to increase and improve their Air Services. With the advent of good weather, we must expect a severe contest before achieving such a definite superiority as will enable us to throw the enemy entirely on the defensive.

In one respect we have been superior to the Germans throughout the war, and that is in the amount of work performed by the Flying Corps for the Army. The Germans have never been able either to carry out such work on a comparable scale, or to stop our men from doing it.

The situation is very similar to that which obtained at the same period of last year. At that time the Germans, reinforced and rested after the winter, put up a serious opposition, and it was only after severe fighting in the air—both at Verdun and in front of our lines—that fighting superiority was established. Even then, this superiority was only maintained by hard and continuous fighting at considerable distances behind the German lines, by which means it was found possible to keep the air above the battlefield practically clear of the enemy.

At the opening of last year's campaign, the main concentration of the German air forces was towards Verdun. This year it appears to be in front of the British forces, a move which probably is connected with the German retirement.

There has not at any time, on any side, in the Western theatre,



THE AERIAL CRUISER.—A watercolour sketch of one of the big Handley Page biplanes being pursued by a "destroyer." The artist, Mr. R. W. Prance, is a fitter at the Handley Page works.

been a situation which could properly be described as the "mastery" or "supremacy" of the air, and when I replied to a sudden supplementary on this difficult point last week, I hope that the House will realise that I had no wish either to overstate or understate the actual situation.

Reinforcements and replacements of material are now being dispatched continuously to our front, and there is every reason to hope that we shall assert our superiority in the air this year, as we did last. But, as I have already stated, we must be prepared for severe fighting before that end is achieved.

Sir H. Dalziel: Would it be in the public interest to state what portion of these machines described as not up to the standard are in use?

Mr. Macpherson: I am afraid I must have notice of that question.

Mr. Pemberton-Billing: On what does the hon. gentleman base his proportion of 7 per cent? Is that on the total of fighting machines, or the total number of men and machines in this country and abroad?

Mr. Macpherson: I cannot say that. I must confess these figures were supplied to me.

Major Hunt: Is the output of fighting and scouting aeroplanes now used by the British equal to that of the Germans, in view of the fact that about the middle of October it was not? Have you caught up with them yet?

Mr. Macpherson: I cannot assent to the statement which the hon. and gallant gentleman has made. I am sure the House will realise that I cannot answer off-hand any question of that sort.

Mr. Faber: Is the inference from what the hon. gentleman has said that during the past winter and also the winter previous the German activity in the manufacture of aeroplanes has been greater than our own?

Mr. Macpherson: No, I do not think it has.

Mr. Billing: Is the hon. gentleman aware that these very machines that he says are not fit to keep our end up in France are at present being ordered in large quantities in this country?

Mr. Speaker: The hon. Member should give notice of that question.

A Frontal Attack.

Speaking on the motion for the Adjournment, **Mr. Billing** said: I wish to express my regret for again having to detain the House on the question of our Air Services. I should like to take the very first opportunity I have of congratulating the Under Secretary of State for War on the frank statement which he made in the House this afternoon. Had we had such a frank statement from his predecessor twelve months ago the position of our Air Service would have been very different from what it is to-day. I would like to point out that, on his own admission, the hon. gentleman was quite unable to give any further facts than those he stated, which I am quite sure satisfied this House, that the answer which he gave to my question had been very carefully prepared. I have had some experience in preparing answers to questions, when I was at the other end, and I can readily imagine who prepared the answer to that question for the hon. gentleman to come to this House and read. The answer was prepared by the Director of Military Aeronautics, and I would like to point out that out of his own mouth he stands condemned.

If we review the answer quite briefly, what is the first thing we find? It is that in the last six weeks 7.6 of our pilots have been killed, 8.3 have been wounded, and 4.2 are missing [Each week]. I asked the hon. gentleman whether he could tell me whether that average was taken on the whole of our Air Service, naval and military, including the thousands of aviators and machines which are in this country, or whether it was taken on the machines and men in France, and, if so, whether it was taken on the fighting efficiency of those men and machines in France.

Assuming that the Director-General of Military Aeronautics made the very best case that he could in answer to the hon. gentleman the Member for Kirkcaldy Burghs (Sir H. Dalziel), it is a very serious statement. It means that we have lost in six weeks 20 per cent. of our men, because the total comes to 20.2 per cent. of the personnel of the Air Service. It means that if this goes on in this way then in six weeks the whole Air Service will be wiped out. That is rather an alarming statement.

[It is rather surprising that the Censorship permitted this 20 per cent. estimate to appear in the daily Press, as it did. Mr. Macpherson's figures give a loss of 20 men per week, or 120 in six weeks. This, on a 20 per cent. estimate, would make out that we had only 600 men flying on the West Front, including pilots, gunners, observers, and all. This would obviously be wide of the mark, so the figure may be neglected. The last sentence appears to be entirely mis-reported, for, if 120 actually represented 20 per cent. of the entire flying personnel, further losses at the same rate for a further period of six weeks would mean the loss of another 20 per cent. of the original number (600), and so 60 per cent. would still be left.

Even supposing the figures of 600 to be accurate, 40 per cent. loss in three months—of which half at least may be presumed to be wounded—would compare favourably with the losses of an infantry battalion during a corresponding period of actual fighting. This, however, does not in the least relieve those in authority from the responsibility of providing the best possible aeroplanes and engines at all times for all purposes.

Further, it is obvious that Mr. Macpherson's figures refer to those flying over the lines only, and returned in the published Casualty Lists, for reports of inquests on accidents in Great Britain alone show a greater number than 7.6 deaths per week, and, big though the number of accidents at home may seem, they are not disproportionate to the amount of flying done.]

The Director of Military Aeronautics cannot say that he has not been warned. It is twelve months ago to-morrow that I first presumed to warn him from the floor of this House, and I and other hon. members have continually warned him that certain machines were inefficient, and that certain methods which he was employing in France and in this country were inefficient. Yet he persisted in this administration. What is the position to-day? I would like to suggest to the hon. gentlemen on the Front Bench that the majority of these fatalities can be directly attributed to by machines by being sent up in which I said twelve months ago that our men were being murdered. I stand here twelve months later, and I say even on this very day that men are being murdered by being sent up in these machines.

Our men are to-day being sent up in B.E.2s gun-spotting. . . . [Certain figures following here have been deleted, as have certain figures and names farther on, as they might, without giving direct information to the enemy, at any rate put him onto a line of reasoning which might be useful.]

These machines are sent six miles out into the enemy's lines. Only recently I had two or three cases brought to my notice of men sent out gun-spotting, and with them they had two of what are called chasing machines; but they lost the chasing machines, they stopped over the lines at the mercy of the German aviators, and they were eventually shot down. Quite recently two fell in flames in our own lines.

I do protest that after twelve months of warning the administration of our Air Service should still permit of this type of machine being used when we have the finest types in the world in this country. We have machines faster than any the Germans have at the front at the present time, while we are sending men up in machines to engage Germans when they have to meet machines which are forty or fifty miles faster and can climb three feet to their one, and which are also properly armed and properly equipped. I want to call the attention of this House to the administration that permits it.

I have frequently said that the administration of Sir D. Henderson is a menace to our Air Service and to this country. I could give the hon. gentleman lists of the men who surround the Air Service, which is being conducted on party lines, and the intrigue, because it is suppressed, is none the less real. The intrigue in the Hotel Cecil now is worse than ever since the outbreak of war.

There are even outward and visible signs. The Royal Naval Air Service (Military Branch) happened to go into the Hotel Cecil and took up its quarters there first, and when the Royal Flying Corps came in later they were welcomed with the notice, "Royal Naval Air Service—No Thoroughfare." The other side at once put up a notice, "Royal Flying Corps—Whoa!" But this is an outward and visible sign of the intrigue which permeates the whole Service.

[Surely this is rather foolish friction, for which someone should be slapped, than real intrigue.]

We are told that we are substituting as quickly as possible other machines for those by which the lives of our men are being thrown away uselessly. But what are the facts? Quite recently an order has been placed for. [Number deleted.] more of these machines with 90-h.p. engines. They will not be delivered for months, and if they were in use to-day these 90-h.p. engines would have to meet 200-h.p. engines of the enemy.

On the other side we have the private constructor. I put a question yesterday as to when the —— [Name deleted.] chaser was first offered to the Admiralty and when it was ordered. Also how many we have got now in the Service of these machines, which can make rings round those turned out by the Government. What was the reply? That it was not in the interest of the country that a reply should be given. If the answer had been that it was not in the interest of Sir David Henderson, I think the answer would have been more correct.

That machine was brought out in April, 1916. I was in-

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France at the time that machine was being tested, and the —— was brought out in competition with it. That machine was offered to the Government and sent down to Farnborough to be tested. It was messed and muddled and played with, and yet its performance was perfectly extraordinary. [Figures deleted.] That was in April, 1916. As a matter of fact, in October, 1916, I understand that the Royal Flying Corps laid down —— squadrons of them, on paper. I challenge the hon. gentleman on the Government Bench to say that there is one of those machines in France to-day. I will challenge him to say that there is one of them that has ever been delivered. Their delivery has been held up while we were taking delivery of these Government-designed machines, which are responsible for the loss of the supremacy of the air—if we ever had it—in France to-day.

What happened only yesterday? I put down that question, and the order, I understand, has been cancelled. . . What is going to be done with those machines? Are they to be burnt? When I asked the hon. Member on the Front Bench yesterday how many orders he had deleted in the last twelve months, he replied that it was not in the public interest to tell me, because, he said, that if Germany knew how many we had burnt they would know how many we had. I fail to follow at all that course of reasoning. . . . If any new expert gets temporary power at one of these offices he immediately burns everything the last man built. [An Hon. Member: "Why not?"]

What is the position as between the two Services? Will the mastery of the air ever be won on partisan lines? There is a naval expert who sits in one room at the Hotel Cecil and a military expert who sits in another room. The stresses, strains, and calculations which one expert demands he insists upon. The Navy passes that machine as fit for active service, but if it is handed over to the Army they immediately scrap it because they say, "We do not approve of these streamlines or that wire."

To show that there is no love lost between them, when the Army hand a machine over to the Navy, they act in exactly the same manner. The requirements of one Service are entirely different from the requirements laid down by the other Service. I would appeal to the House to take this matter seriously now. We do not want any more public inquiries. We have had quite enough of the fallacy of public inquiries. A committee of this House might well inquire into the matter—not a Committee appointed by the people who are in question, but a Committee appointed by the House might inquire into the administration and command of the Royal Flying Corps and the Royal Naval Air Service with considerable advantage to the cause for which we are fighting.

General Henderson—presumably it is he who makes the statement—says :—

"The situation in the air on the British front in France at the moment is as undecided as during the winter months."

I understood that during the winter months we were supreme in the air. He said later :—

"The situation is very similar to that which obtained in the same period last year, when at that time the Germans, reinforced and rested during the winter, put up a serious opposition."

If that is all the advance we have made in twelve months I am sorry. I think if he had said while we rested the Germans worked and prepared it would give a better answer to what is taking place in France to-day.

We do not take into consideration that the German air service is not only keeping the British Air Service at bay, but the Russian and the French, which is a far greater Air Service than ours, and it is keeping the Air Service of Italy, and what little Roumania has got, and all the various Allies.

I do not know whether I shall ever be able to impress upon the House the importance and the urgency of taking up this problem seriously. I do not want to repeat the many arguments I have put forward in support of that, but I appeal to the Under Secretary to inquire very closely into the actual conditions obtaining in France at the present time, and I tell him that I shall raise this question of the air on every available occasion until such time as we have regained that supremacy which for a few brief months, after as many months' agitation, we gained in the summer of last year.

The Under Secretary of State for War (Mr. Macpherson): I have no reason personally to complain of the remarks which my hon. friend has made about me. I endeavoured, in the answer which I gave to-day, to give the facts of the case as honestly and as concisely as I possibly could within the limits of a question and answer. But while I am grateful to him for his generous appreciation of what he terms my honesty in my statement, I must say that appreciation is considerably detracted from when I find him making a most violent and bitter attack upon a colleague of mine on the Army Council. He has spoilt what might or might not be a good case by his exaggeration of statement.

He has accused the Army Council of murdering British aviators. I defy him to produce one single instance of the murdering of a British aviator in France or in this country. The hon. gentleman made the same statement before in such a way as to force the Government to appoint a judicial inquiry.

Mr. Billing: Not judicial at my request.

Mr. Macpherson: I am within the recollection of Members of this House. The hon. gentleman forced the late Government to appoint a judicial inquiry, presided over by a High Court judge, with assessors who were men of skilled knowledge in engineering. He was asked to substantiate the accusations which he made in this House, and nobody knows better than the hon. gentleman that he failed, and completely failed, to substantiate those accusations. Notwithstanding that lesson which he received at the hands of the judicial tribunal, for which he himself pleaded, he comes forward again and makes the same rash and reckless statements. I can assure my hon. friend that it does grieve anybody who is anxious that these gallant fellows who are fighting for us at the front should not be handicapped who now find the hon. Member coming forward at this time of night and rashly and recklessly making statements which only serve to impede their gallantry and break down their moral for which they have become famous all over the world. I again ask the hon. Member to come forward and substantiate the statements which he has made.

Mr. Billing: I shall have very much pleasure in giving my hon. friend privately a great deal of information which I prefer not to give in this House.

Mr. Macpherson: I must say, speaking on behalf of the Air Service, that I am afraid the evidence which my hon. friend would bring forward would receive the same fate at the hands of a judicial inquiry as did the evidence which he brought before the other judicial inquiry.

Mr. Hogge: They had not the power to call witnesses.

Mr. Macpherson: We are told now it was not a judicial inquiry.

Mr. Hogge: I say there was no power to call witnesses.

Mr. Macpherson: That fact does not make it any the less judicial. It was for the hon. Member to substantiate the case that he had put forward. He had the power and the opportunity before that inquiry, not only to appear himself with all his facts in support of his statements, but he could produce any evidence he liked. There was no attempt of any sort or kind at that inquiry to prevent the hon. Member coming forward himself with all his facts and bringing forward any witnesses or any evidence he cared to bring before that Committee. That Committee was presided over by one of the most distinguished of our judges, Mr. Justice Bailiache. I do not know whether the hon. Member would like us to have another inquiry into the statements which he has so rashly made before the House to-night.

Mr. Billing: I should, indeed.

Mr. Macpherson: The hon. Member said a few minutes ago that he did not want one.

Mr. Billing: Not a judicial inquiry. I want an inquiry by experts who understand aviation and who have seen flying.

Mr. Macpherson: What sort of inquiry does the hon. Member want? He knows perfectly well that he was satisfied with the judicial inquiry when we promised it, and when we promised to appoint a High Court judge to preside, with skilled assessors to assist him.

Mr. Billing: No. I protested fiercely against it.

Mr. Macpherson: In any case the hon. gentleman came forward and submitted himself to that inquiry, and I hope that he was satisfied with the result. He went on again to attack Sir David Henderson. He is probably the only man in this country who is supposed to know anything about the Air Service who has gone out of his way to attack Sir David Henderson.

Everybody in the country knows that the splendid efficiency of the Air Service is due in the largest measure to Sir David Henderson. He has grown up with our Air Service. If you were to ask anybody in the Air Service to-day, whatever his position, one and all would admit that the one great benefactor of the Service, who has made it the splendid Service which it is, and has made it the envy of the other branches of our Armies, as it is to-day, is Sir David Henderson.

It being half-past Eleven of the clock, **Mr. Speaker** adjourned the House without question put, pursuant to the Standing Order.

[It is certainly regrettable that Mr. Pemberton-Billing, having a really good case again, should weaken it by over-statement, as Mr. MacPherson said. It is true that the administration for which Sir David Henderson stands responsible has made grave mistakes, as was shown quite clearly by the report of Sir Clement Baillache's Committee, despite the absence of direct evidence, but for these mistakes one should rather feel sorry for Sir David Henderson than blame him.

The Flying Corps owes much to General Henderson's efforts in the early days, when he had to strive for its existence against a hostile Ordnance Department and an unsympathetic Treasury. The tragedy of the situation appears to be that General Henderson, not being himself an engineer, has had ill-fortune in his technical

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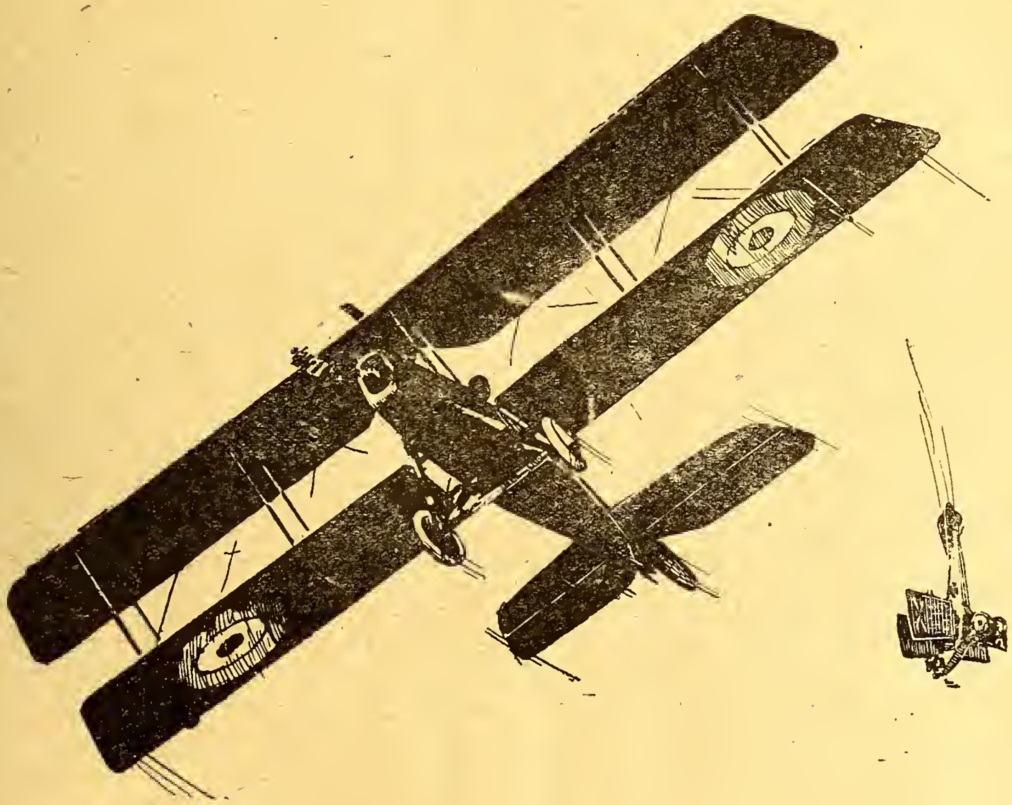
A BRITISH PILOT AND A—



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advisers, and has been induced to rely on their promises of what their designs were going to be about to do in the near future, instead of accepting what independent designers could offer him in actual existence.

The result has been that over and over again orders for the best existing trade machines or engines have been held up because the next B.E., or R.E., or F.E., or S.E., has been going to be just a bit better. And the next B.E., R.E., F.E., or S.E., has always been just a bit worse, so that the "trade" machines have had to be ordered to make up for lost time, by which date the said "trade" machines have lost their first blush of youth, and have just failed to be the real surprise to the enemy which they might have been if they had been ordered immediately they were produced, built quickly in quantities, and sent into action at once.

For some curious reason, accumulating age and experience does not seem to have impressed on General Henderson the lesson that on every occasion it has been the just slightly out of date "trade" machine and engine which has saved the situation when, as he is reported to have said himself on one occasion of stress, he has been badly let down by the Royal Aircraft Factory—before its reform, of course.

Happily General Henderson has had very able military assistants, as distinct from his technical advisers. He is equally as responsible officially for the magnificent work which they have produced from the R.F.C. on active service as he may be for the grave errors of his technical staff. Thus it appears logically wrong to state that he is a menace to the Flying Corps if he is officially responsible for the splendid work of the Corps despite the machines they have had to use. Which nobody can deny.—C.G.G.]

THE "THREE SOCIETIES" SOIREE.

The "At Home" at the Grosvenor Galleries on March 16th may safely be called the first real social function to take place in connection with aeronautics, and the Countess of Drogheda may well congratulate herself on her success in having collected together so many interesting personalities. The gathering was of that species of entertainment which, in the writer's youth, some 30 and odd years ago, was known as a *soirée*, conveniently pronounced "sworry," and consisting of a combination of mutual improvement, mutual admiration, and mutual inspection.

Though by no means largely advertised, the Grosvenor Galleries were as full as they could well be, and although the number present probably did not exceed 500, it was just as well for the comfort of everyone that no more people arrived. If Lady Drogheda ever intends to hold a really big "Air At Home," and devotes her talents systematically to booming it, one hopes that she will borrow the Crystal Palace, or Buckingham Palace, or some such place for the purpose. Perhaps a garden party in Hyde Park during the summer after the war, when all the active-service pilots and their belongings could go, might be done.

In all seriousness, however, the evening was distinctly a good thing, in that it marked the definite recognition by those in high places of the three institutions concerned with aircraft, and one cannot imagine that any but a woman's wit could have brought about such recognition in so neat a way. The Royal Aero Club, the Aeronautical Society, and the Society of British Aircraft Constructors were all well represented by their respective Chairmen and various personages of their Councils and Committees, besides an assortment of their ordinary and more humble members. The Air Board was represented by Commodore Godfrey Paine, C.B., and Lieut.-General Sir David Henderson, K.C.B., and by sundry minor but quite important officers. War was represented by the Minister for War, Lord Derby, *in propria persona,* and Commerce by Sir Arthur Ducros, Bart., M.P. And many other people of more or less importance were there to be seen, or, perhaps, in order to avoid ambiguity, one had better say were to be seen there.

Those present were officially received by Lord and Lady Sydenham, and, after half an hour or so allowed for an inspection of the exhibition of aeronautical history, as many as could do so packed themselves into the largest *salle* to listen to improving discourses. The programme was "presented" by Lieut.-Col. Mervyn O'Gorman, C.B., in one of his usual felicitous and facetious speeches, whereafter Lord Sydenham, K.C.M.G., G.C.I.E., F.R.S., late of the late Air Board, gave a short address of the sound practical kind to which he has accustomed members of the Aeronautical Society in the past.

The more one hears or reads of Lord Sydenham, the more one regrets that he is not playing a bigger part in the building up of our Air Forces. On this occasion, he referred briefly to what could be achieved if we had enough aeroplanes on the West Front, and pointed out that though the absolute command of the air was not likely to be obtained under any circumstances, much may be done towards obtaining such command. He said that the rise of aeronautics was all to the advantage of the British Empire, and that the gallantry of our pilots at home and overseas showed how fitted we are as a people to become strong in the air. He referred also to the "very heavy strain on our airmen to-day," while the Germans are straining every power to hide their withdrawal.

As to the future, he stated that we have nothing to fear technically if our best brains are used to the best advantage in building up our air forces. In his opinion we can only reach our full power in the air by proper organisation, and we are not as yet in possession of such organisation. He further expressed his belief that the civil uses of aircraft will increase very considerably in the future.

Brigadier-General Brancker, Director of Air Organisation, referred to this meeting of the Three Societies as historic. Speaking on "Flying of To-Day," he described rapidly and graphically the uses of aircraft in war, and the alternations of the fortunes of aerial fighting. He admitted the damage done by the Fokker monoplanes a year and more ago, and remarked that their efficacy was assisted by newspaper advertising in this country; also, he showed how their temporary advantages had been overcome. With all respect to General Brancker, one would suggest that advertising in the British Press did not assist the Fokker monoplane in raising a climb of 1,000 ft. per minute, and a speed of 90 to 100 miles an hour, while our poor old B.Es. were doing about 250 ft. per minute, and about 65 miles an hour. Nor did it make the 9-cylinder Uberursel engine reliable when the R.A.F. was not.

As regards the popular view of aircraft in war, he remarked epigrammatically that people in this country are slow to believe but fanatical in their beliefs, hence the fact that those who were once unbelievers in flying are now crying out for the destruction of Berlin and the abduction of the Kaiser by aeroplanes. As the outcome of war, he, who was once regarded as a military dreamer, had seen all his dreams fulfilled, and many of them outstripped by the actual performances of aeroplanes to-day.

On the subject of the defence of this country against aerial invasion in the future, General Brancker expressed his belief that defence against airships was a task which could be handled with sufficient certainty, but defence against fleets of aeroplanes was a much more difficult matter. So difficult did this problem appear to him that he believed our best defence in future will be to build up such strength in the air that no other nation will dare to attack us for fear of the consequences. In this direction, he suggested, lies the way for the creation of a great Imperial Air Service.

Following General Brancker's much-appreciated address, a number of interesting kinematograph films were exhibited, showing officers of the R.N.A.S. and R.F.C. descending by parachute from kite-balloons and aeroplanes. Captain Collett's dive from a B.E., affording, in particular, a *moment très émotionant.* Various experiments in the simultaneous launching of parachutes side by side were of great interest, and the descent of six parachutes at once from a small airship, demonstrating how the whole crew could save themselves in case of fire, was highly educative.

Apropos which, it has long been evident that the crews of inflamed Zeppelins could escape with their lives if equipped with parachutes, and it is, therefore, to be assumed that the reason why they are not so equipped is that the German Naval authorities fear that when once over England so many of each of the crews would discover imaginary fires, and proceed to get out and walk, that there would be difficulty in navigating the ships home again. So far as the crews are concerned, apart from the officers, possibly the "Kamerad" parachute might become too popular.

After this display, Mr. Handley Page exhibited and described some highly interesting kinematograph pictures of the big H.P. machines on the ground and in the air, the non-technical section of the audience, to whom the vastness of the machines evidently came as a surprise, being obviously hugely impressed, and even the more technical people being glad of another opportunity of seeing the pictures.

Subsequently, all adjourned for refreshment, conversation, and mutual inspection, so that it was well on towards midnight when everyone had departed. Altogether, it was quite an entertaining evening, and one hopes that Lady Drogheda may be encouraged to repeat the performance on a larger scale at a later date, in her capacity as a Member of Council, and guide, philosopher and friend to the Aeronautical Society, which is evidently already reaping the benefit of its renewed publicity. At any rate, one is assured by the present example of this energetic lady's capacity for capturing the lions and the lesser fauna of the aeronautical world, and her skill in storing them in peaceful proximity to one another, that such a gathering would be an even greater success, and would materially aid the peaceful penetration of the Gospel of Aeronautics into the circles of the elect.—C. G. G.

The Importance of the Postscript.

On February 5 we were asked to quote for a Factory in the Midlands, and the Architect concerned added the following postscript:

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NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," March 13th, 1917.

War Office, March 13th.

REGULAR FORCES.—Establishments.—R.F.C.—Military Wing.—Balloon Comdr. (Graded as a Balloon Officer).—Temp. Sec. Lt. R. B. Wann, Gen. List, from a Balloon Officer, and to be temp. Lt. whilst so employed, Jan. 29th

Adjt.—Capt. H. P. D. Helm, Bord. R., Spec. Res., from a Flying Officer (Observer); vice Capt. G. B. Fraser, King Edward's Horse, Spec. Res., Feb. 13th.

Equipment Officers, 2nd Cl.—From 3rd. Cl., and to be temp. Lts. whilst so employed :—Sec. Lt. T. McI. Mackay, Spec. Res.; Sec. Lt. J. Pearce, K.O. Sco. Bord., Feb. 6th.

Group Instructors in Gunnery.—Graded as Flt. Comdrs. :—Capt. M. G. B. Copeman, Leic. R., a Flt. Comdr., from a Wing Instr. in Gunnery (graded as a Flt. Comdr.); Lt. (temp. Capt.) S. H. B. Harris, Spec. Res., a Flt. Comdr., and to retain his temp. rank whilst so employed, Jan. 10th.

From Wing Instructors in Gunnery.—Graded as Flt. Comdrs. : Sec. Lt. (temp. Capt.) W. G. B. McKechnie, R. Sc. Fus., a Flying Officer, and to retain his temp. rank whilst so employed, Jan. 10th.

Capt. J. H. C. Minchin, Sco. Rif., a Flt. Comdr., vice Sec. Lt. (temp. Capt.) W. G. B. McKechnie, R. Sc. Fus., Jan. 17th.

Sec. Lt. (temp. Capt.) R. G. Heyn, Spec. Res., a Flying Officer, and to retain his temporary rank whilst so employed, vice Capt. M. G. B. Copeman, Leic. R., Feb. 17th.

Group Instructor in Gunnery.—Graded as an Equipment Officer, 1st Cl. :—Capt. D. E. Ward, Lond. R., T. F., and to be secd., vice Lt. (temp. Capt.) S. H. B. Harris, Spec. Res., Feb. 17th.

Wing Instructors in Gunnery.—Graded as Flt. Comdrs. :—Capt. J. H. C. Minchin, Sco. Rif., a Flt. Comdr., Jan. 10th. And to be temp. Capts. whilst so employed :—Flying Officers.—Sec. Lt. A. P. Davidson, High. L.I.; Sec. Lt. H. J. Brewster, Midd'x. R., vice Capt. J. H. C. Minchin, Sco. Rif., Jan. 17th. Temp. Capt. C. O. F. Modin, Gen. List, a Flying Officer, Feb. 3rd. And to be temp. Capts. whilst so employed :—Flying Officers.—Temp. Sec. Lt. A. R. C. Cooper, Gen List; Sec. Lt. C. H. Stokes, Spec. Res.; Sec. Lt. A. P. Hartley, Ches. R., T.F., Feb. 6th. Temp. Lt. P. A. Moodie, Gen. List, vice Sec. Lt. (temp. Capt.) P. G. Heyn, Spec. Res., Feb. 17th.

Graded as Equipment Officers, 1st Cl., and to be temp. Capts., whilst so employed :—Sec. Lt. (temp. Lt.) A. C. Bishop, Yeo., T.F., from an Equipment Officer, 3rd Cl., Nov. 14th, 1916. Sec. Lt. W. C. Lambert, Yeo., T.F., and to be secd., Jan. 10th.

Schools of Instruction.—Central Flying School Instrs. Capt. A. C. Clarke, Welsh R., a Flt. Comdr., vice Lt. (temp. Capt.) A. M. Wilkinson, D.S.O., Hamps. R., T.F., Jan. 12th. Sec. Lt. (temp. Capt.) T. Davidson, Cam'n. Highrs., T.F., a Flt. Comdr., vice Capt. (temp. Maj.) H. R. Nicholl, Spec. Res., Feb. 10th.

School of Aerial Gunnery.—Comdt.—(Graded as a Depôt Comdr.).—Lt. (temp. Maj.) H. E. Chaney, Lan. Fus., from a Chief Instr. (graded as a Park Comdr.), and to be temp. Lt.-Col. whilst so employed, Feb. 6th.

Instructors.—(Graded as Equipment Officers, 1st Cl.).—Sec. Lt. (temp. Capt.) A. J. G. Anderson, Lond. R., T.F., and to retain his temp. rank whilst so employed. Temp. Lt. H. Cockerell, Gen. List, from an Asst. Instr. (graded as an Equipment Officer, 2nd Cl.), and to be temp. Capt. whilst so employed, Feb. 6th.

Assistant Instructors.—(Graded as Equipment Officers, 2nd Cl.). :—Lt. F. R. Alford, M.C., Canadian Mach. Gun Serv.; Lt. G. H. J. Mercer, D. of Corn. L.I., and to be secd.; Lt. J. N. H. Brooke, L'pool. R., T.F., from Mach. Gun Corps. And to be temp. Lts. whilst so employed :—Sec. Lt. (on prob.) J. A. Cooper, Yeo., T.F., and to be secd.; temp. Sec. Lt. C. P. H. Gunyon, Gen. List, an Equipment Officer, 3rd Cl.; temp. Sec. Lt. H. F. Alton, Gen. List, a Flying Officer (Observer); temp. Sec. Lt. J. H. Gaudion, Durh. L.I., and to be transfd. to the Gen. List, Feb. 6th.

Memorandum.—Sergt. J. Hooper, from R.F.C., to be temp. Sec. Lt. (on prob.) for duty with the Mil. Wing of that Corps, Jan. 27th.

* * *

From the "London Gazette" Supplement, March 14th, 1917.

War Office, March 14th.

REGULAR FORCES.—The undermentioned Wt. N.C.Os. and Man to be temp. Sec. Lts. :—

Memoranda.—For duty with R.F.C.—L.-Cpl. H. Harris, from Can. Engrs., Jan. 4th. Cpl. E. J. Hare, from S. African Sig. Co., Feb. 12th. Sergt. R. N. L. Munro, from R.F.C., Feb. 16th.

ESTABLISHMENTS.—R.F.C.—Mil. Wing.—Flt. Comdr.—Sec. Lt. K. L. Caldwell, Spec. Res., from a Flying Officer, and to be temp. Capt. whilst so employed, Feb. 22nd.

Balloon Co. Comdr. (graded as a Flt. Comdr.).—Temp. Lt. I. P. H. Preston, Gen. List, from a Balloon Officer, and to be temp. Capt. whilst so employed, Feb. 20th.

Flying Officer.—Temp. Lt. S. Stretton, Gen. List, from a Flying Officer (Observer), Feb. 17th, seny. from March 16th, 1916.

Balloon Officers.—Lt. (temp. Capt.) G. H. Green, R. Scots, T.F., and to be secd., Feb. 12th. Lt. (temp. Capt.) A. H. C. Hope, Sea. Highrs., T.F., and to be secd., Feb. 21st, seny. from May 23rd, 1916. Lt. J. P. Walters, R. Dub. Fus., and to be secd., Feb. 21st. Sec. Lt. B. G. L. Ellis, R. Guernsey Art. and Engrs. Mila., from temp. Sec. Lt., R.A., Feb. 21st, seny. from June 16th, 1916. Sec. Lt. H. A. Edridge-Green, R. W. Fus., and to be secd., Feb. 21st. Capt. H. A. Page, S. Staff. R., T.F., and to be secd., Feb. 25th, seny. from May 23rd, 1916. Capt. R. L. S. Raffles, R. W. Fus., Spec. Res., reverts from a Balloon Co. Comdr. (graded as a Flt. Comdr.) to a Balloon Officer at his own request, Feb. 20th, seny. from Nov. 5th, 1915, substituted for notification in "Gazette" of Feb. 26th. Capt. S. C. Raffles, 3rd R. W. Fus., Spec. Res., reverts from a Balloon Co. Comdr. (graded as a Flt. Comdr.) to a Balloon Officer, at his own request, Feb. 10th, seny. from Sept. 5th, 1915.

Equipment Officers, 1st Cl.—To be transfd. to Gen. List, and temp. Capts. whilst so employed.—Temp. Lt. W. H. Ewen, Army Ord. Dept.; temp. Lt. G. Eliott-Lockhart, Army Ord. Dept., Jan. 1st. 3rd Cl.—Lt. L. E. Palmer, York and Lanc. R., and to be secd., Jan 1st. Sec. Lt. (on prob.) A. C. Truelove, Spec. Res., Feb. 15th. Temp. Sec. Lt. A. L. Hyslop, Gen. List; temp. Sec. Lt. A. E. Gay, Gen. List; Sec. Lt. F. A. W. Braine, Gen. List, Feb. 17th.

Schools of Instruction.—Schools of Mil. Aeronautics.—Chief Instructor.—(Graded as a Sqdn. Comdr.).—Temp. Capt. C. E. I. C. Anne, Gen. List, from a Flt. Comdr., and to be temp. Maj. while so employed, from Sept. 19th to Oct. 31st, 1916.

Assistant Instructor.—(Graded as an Equipment Officer, 2nd Cl.).—The appt. of Sec. Lt. (temp. Lt.) A. C. Bishop, Berks. Yeo., T.F., notified in the "Gazette" of Feb. 8th, is cancelled.

Memoranda.—Sec. Lt. R. R. Prentice, R.F.C., Spec. Res., to be temp. Capt. whilst specially employed, March 15th.

Cpl. Frank Arthur William Braine, from R.F.C., to be temp. 2nd Lt. for duty with the Mil. Wing of that Corps, 30th Jan., 1917.

The undermentioned to be temp. 2nd Lts. (on prob.) for duty with R.F.C.—Albert Edward Abell, 3rd March, 1917. Leslie Ormonde Millington, 9th March, 1917.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Mil. Wing.—The Christian names of Sec. Lt. (on prob.) Bernhard Owen Watts are as now described, and not as in "Gazettes" of Sept. 13th, Nov. 11th and 15th, 1915, and Oct. 11th, 1916.

The notification in the "Gazette" of Oct. 3rd, 1916, of the appt. as Sec. Lt. (on prob.) of R. Berl, is cancelled.

The following Sec. Lts. (on prob.) are confirmed in their rank: E. C. Deeth, S. F. Brown, G. E. P. Elder, P. S. Leigh, J. E. J. Crawford, A. S. Windsor, J. W. Parkinson, F. Ryder, J. M. Furnival.

To be Sec. Lts. (on prob.) J. H. Ledeboer, Dec. 14th, 1916. R. O. King, Feb. 25th.

* * *

From the "London Gazette" Supplement, March 15th, 1917.

War Office, March 15th.

REGULAR FORCES.—Staff.—Staff Capt.—Lt. (temp. Capt.) D. B. Sanders, R.F.C., Spec. Res., from an Equipment Officer, 1st Cl., and to retain his temp. rank whilst so employed., vice temp. Capt. C. M. Smith, M.C., Gen. List, Feb. 26th.

Establishments.—R.F.C.—Military Wing.—Flying Officer.—Temp. Lt. T. L. W. Stallibrass, Gen. List, from a Flying Officer (Observer), Feb. 15th, seny. from Dec. 19th, 1915.

Equipment Officers, 1st Cl.—Temp. J. Goodman, Gen. List; temp. Capt. C. P. White, Gen. List; Capt. A. G. Shortt, Ret. List; and to be temp. Capts. whilst so employed :—Lt (D.O.) C. Mason, R.A., and to be secd.; temp. Lt. T. M. Rogers, Gen. List, from the 2nd Cl.; Sec. Lt. G. Ralston, Spec. Res., from the 3rd Cl.; Sec Lt. J. G. Hope, Spec. Res., from the 3rd Cl.; Sec. Lt. D. MacK. P. Riach, Spec. Res., from the 3rd Cl., Dec. 14th, 1916. Temp. Lt. A. H. W. Skitt, Army Ord. Dept., and to be transfd. to Gen. List, Jan. 1st.

2nd Cl.—Sec. Lt. (temp. Capt.) C. F. Cape, Yeo., T.F., and to retain his rank whilst so employed. Lt. W. E. Grey, Lond. R., T.F., and to be secd. And to be temp. Lts. whilst so employed :—Temp. Sec. Lt. E. R. Atkinson, Gen. List, from a Flying Officer; Sec. Lt. G. Dennison, Spec. Res., from the 3rd Cl.; Sec. Lt. W. Burnside, Arg. and Suth'd Highrs., Spec. Res., and to be secd. From the 3rd Cl., and to be temp. Lt. whilst so employed :—Sec. Lt. C. L. Hardy, Spec. Res.; Sec. Lt. S. H. Hawes, Spec. Res.; Sec. Lt. G. F. Harmer, Spec. Res.; temp. Sec. Lt. J. M. Macaulay, Gen. List; Sec. Lt. J. T. Rossiter, Spec. Res.; Sec. Lt. H. L. U. Clark, Spec. Res.; Sec. Lt. A. G. Griggs, Spec. Res.; Sec. Lt. F. A. Woolfe, Spec. Res., Dec. 14th,

(Continued on page 752.)

THE BRITISH & COLONIAL
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The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

VIII.—THE BRITISH & COLONIAL AEROPLANE CO., Ltd.

Like many another firm, the British and Colonial Aeroplane Co. has launched out to a considerable degree since 1914; but of none could it be said with less justice that it had been "made by the war." As a matter of fact, it was the biggest manufacturing concern in the British Aircraft industry before the war, and its flying schools were no less famous.

From the works at Filton, Bristol, numbers of aeroplanes had been turned out before the war began, and no fewer than 336 pilots had been trained in the firm's schools up to the time when they were taken over by the War Department. Of these pilots, 206 were Army officers, 47 were Naval officers and the civilians numbered 83.

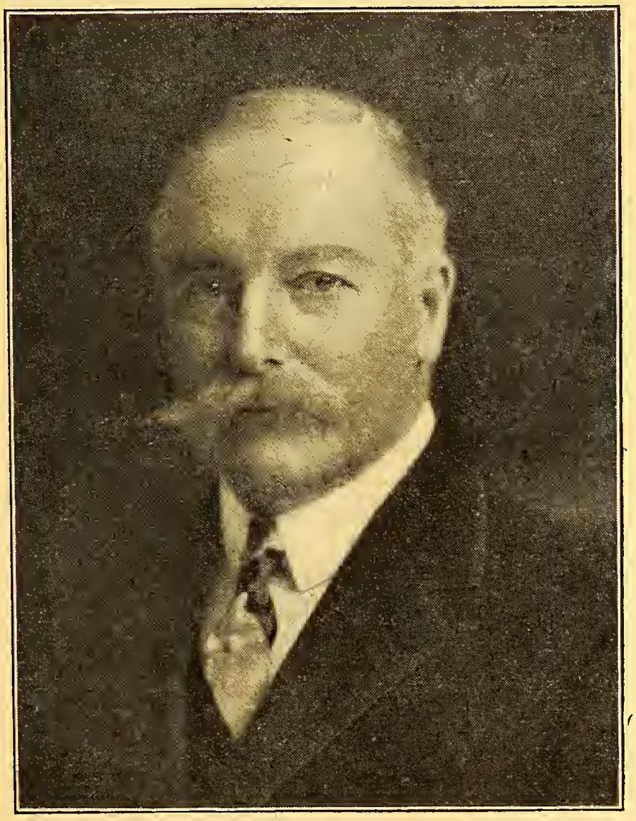
The totals from all other schools combined at the same period were as follows: Army officers, 177; Naval officers, 78; and civilians, 286; total, 541. The Bristol Schools alone, therefore, were responsible for the training of over 38 per cent. of the pre-war pilots.

Sir George White's Foresight.

There has been no more conspicuous "weak spot" in the commercial life of this country than the reluctance to risk money in the development of an idea, but the case of Sir George White, whose death one had the sad duty of recording in November last, is a shining example to the contrary, and he founded the present company on February 28th, 1910, in the full conviction that the aeroplane was bound to effect a revolution in the history of the world.

Sir George White's first acquaintance with aviation was through his annual visits to France and the Riviera, when the French aviators were beginning to make their first experimental flights. True to the pioneer instinct, which was characteristic of Sir George, he immediately gauged the possibilities of this new scientific development, and saw its practical relation to a future industry, and its national value for Naval and Military purposes.

He spared neither effort nor capital in the realisation of his views, and it was largely owing to his personal initiative that not only has the company itself become a highly important undertaking, but aviation came to be recognised, albeit to an inadequate degree, by the military authorities.



The Late Sir George White, Bart.

Sir George White, as the Chairman of the Company, took the keenest personal interest in all its affairs right from the commencement to the time of his death. His belief in the future of aviation never faltered, and he conducted the enterprise with a whole-hearted enthusiasm which brushed aside the discouragements—and they were many—which aviation suffered under in the pioneer days.

The Genesis of the Bristol Co.

From the beginning, there were associated with Sir George other members of his family; Mr. Samuel White, his brother, who now becomes Chairman of the Company; and his son, Sir G. Stanley White, who, as Managing Director, has been identified with all the Company's activities, and the vigorous prosecution of the pioneer development.

In addition, there were his nephews, Mr. H. White Smith, the Secretary, and now Director, who is well known as the first Chairman of the Society of British Aircraft Constructors, and Mr. Herbert J. Thomas, the Works Manager, also now a Director, who qualified as a pilot so far back as 1910; also Mr. Sydney E. Smith—now Lieut.-Col., R.F.C.,—who was well known in the first year of the Company's work at Brooklands, when he qualified as a pilot before going out with the Company's Australian Commission.

In February of that year Sir George White having definitely determined to embark on the manufacture of aeroplanes, in his Chairman's speech to the shareholders at the annual meeting of the Bristol Tramways and Carriage Co., stated "that he and his brother had determined, personally, to take the risks and expense of the endeavour to develop the science of aviation."

The First Factory.

Acquiring a licence to manufacture the Zodiac machine in England, the newly formed Company exhibited at Olympia in March, 1910, and started building at Filton in a motor-bus shed. In May the first home-built machine was installed in a hangar at Brooklands.

The Zodiac design, however, was not a success, and attention was then turned to the Henri Farman type. Then the 50-h.p. Gnome which Christaens was using at the Bournemouth meeting was acquired and fitted to the first machine built on the new lines. This was flown for the first time on August 8th, and afterwards at the Lanark meeting.

In September the Company obtained a lease from the War Office for ground on Salisbury Plain, and set up hangars of considerable size on Lark Hill, the instruction of pupils being taken up on a large scale.

An Offer to the War Office.

Here let it be said that from the very first Sir George White had foreseen the importance of the aeroplane as a military adjunct, and even in May, 1910, had waited upon Mr. (now Lord) Haldane, the Minister of War, and offered to place the entire resources and services of the Company at the disposal of the War Department, and also to abstain from all business with foreign Powers.

Mr. Haldane not only declined the offer, but stated that he would prefer that the Company "should endeavour to develop business relations in the fullest way with all foreign countries without restriction." Small wonder is it, therefore, that the British and Colonial Aeroplane Co. should have determined to spread its operations over the widest possible field!

A Fair Warning.

Apologists for Lord Haldane in particular and the War Department in general may feel inclined, perhaps, to remark that this happened nearly seven years ago, since when much water has flowed under the Thames bridges, and that it is not easy at this juncture to appraise the degree of aviation knowledge which a Secretary for War could be expected to possess at that distant date. But I may at least point to a fact which is essentially germane to the issue—namely, that M. Blériot had crossed the English Channel ten months previously, and thereby at one stroke not only established the practicability of the aeroplane, as such, but also deprived Great Britain of its time-honoured insularity. For these reasons the importance of the development of aviation in the military sense might well have been expected to commend itself even to the proverbial "man in the street."

On Manœuvres.

In September, however, the Company did make a further effort to interest the British military authorities in aviation, and Capt. Bertram Dickson attended at Army Manœuvres on Salisbury Plain, in the Autumn of 1910, where for the first time, so far as England is concerned, an aeroplane was used for scouting purposes.

No small historic interest attaches to a photograph of that period showing Capt. Dickson, after returning from a reconnaissance flight, explaining the position of the "Blue" army to the officers of the "Red."

Demonstrations at Home.

In the following month was given another useful demonstration of a different kind; an Aero Club had been formed locally, and in conjunction therewith the Company arranged a week's display of flying possibilities. A hangar was erected on Durdham Down, and Bristol machines with Messrs. Henry M. Jullerot (now Flight Lieut., R.N.A.S.) and Tétard as the pilots made many notable flights, especially over the Avon Gorge, which was in those days a terrifying chasm for an aeroplane to cross.

The First Overseas Ventures.

An aviation commission was sent out in November to Australia, under the charge of Mr. Sydney E. Smith, who took with him as chief pilot Mr. Joseph J. Hammond, now Capt., R.F.C., and the late Mr. Leslie McDonald.

A second commission was sent to India with M. Jullerot as chief pilot.

Both these commissions got in touch with the military authorities and gave various demonstrations.

In India, Sir Douglas Haig, who was then Chief of Staff, took very great interest in the matter, and arranged for a public demonstration to be given on the Maidan racecourse at Calcutta. It may be added that the officer appointed by Sir Douglas as observer on the use of aeroplanes at the Indian Military Manœuvres which followed was Captain (now General) Brancker, R.A.

Orders from a Foreign Power.

Before the year closed an order was received from the Russian Government, to whom several Bristol biplanes were supplied.

The First Bristol Monoplane.

Early in 1911 the first Bristol monoplane was designed by Mr. George Challenger. Matters had, meanwhile, become very active, both at Salisbury Plain and at Brooklands, and it may be mentioned that among the firm's pilots of this period were Captain (now Major) H. F. Wood. Another famous Bristol pilot was the late Mr. Collyns Fizey, who became a Flight-Commander, R.N., and died in Greece as a Capitaine de Frégate in the Greek Navy while serving with the British Naval Mission early in the war. Others were the late Mr. Graham Gilmour, M. Tabuteau, Mr. A. R. Low (now Lieut., R.N.V.R.), Mr. O. C. Morison (now Lieut., R.N.V.R.), and Mr. James Radley.

The early designers, in addition to those already mentioned, were Messrs. Gabriel Voisin, Gordon England, and Pierre Prier.

The First War Office Order.

On March 10th, 1911, the Company received its first order from the War Office for Bristol biplanes; and the first machine was delivered in May.

Cross-country flights had now become commonplace, but Mr. Graham Gilmour created a diversion by flying over the Oxford and Cambridge crews, during the 'Varsity Boat Race, on a Bristol biplane.

More Overseas Missions.

In April a commission was sent out to South Africa and the Straits Settlements in charge of M. Christaens, and, in the same month, Mr. White Smith took over a biplane and the first monoplane to the Petersburg Exhibition, and was then presented to the Tsar, who displayed great interest in the exhibits.

His Majesty was evidently then impressed with the possibilities of aircraft, and expressed his gratification at seeing a British firm represented, the Bristol Co. being the only British aircraft firm to exhibit.

New Designs.

In the direction of new designs the Company was particularly busy at this period, and these included a monoplane designed by Prier—who, by the way, had come to this country by the medium of a cross-Channel flight,—an all-steel monoplane, designed by Gabriel Voisin, with a 70-h.p. Gnome engine, a two-seater (side by side) monoplane for school purposes, and a racing biplane. The last-named may well be regarded as the prototype of the famous "Scout," for its wing measurement was only 8.2 metres, or 26.9 feet.

Incidentally, it may be mentioned that since its establishment in 1910 the British and Colonial Aviation Co. has produced some forty different types of machine. And it is particularly worthy of note that fertility of design has gone hand in hand with excellence of construction. "Finished like a Bristol" has become synonymous with the highest class of workmanship wherever aeroplanes are used, and outside finish has been scrupulously combined with the best material obtainable.

1911 Developments.

M. Tabuteau completed the European Circuit in June, 1911, on a Bristol biplane, and in July a Bristol squadron of five machines was entered for the "Daily Mail" Round Britain contest. In those days less was known about engines than is known to-day, and the fact that the Bristol team did not finish the course may safely be ascribed to engine troubles, but those who were concerned with that historic contest will always remember the splendid organisation of supply wagons and mechanics prepared by the Bristol Co. for their team, and the excellent impression given by the Bristol machines at the time.

An item of interest in connection with Service matters is the fact that in the following month Brigadier-General David Henderson took his ticket at Brooklands on a Bristol biplane.

Those days of 1911 and 1912 were indeed the Golden Age of aviation in England. Every trip on a school machine was a venture into the unknown, for the problems of stability were still unsolved, stress diagrams were things of the future, and aeroplanes flew as much because of the skill of the pilots as for any other reason. The Bristol Schools at Lark Hill and at Brooklands were a pure joy, for in them were gathered as fine a collection of pioneers and sportsmen as has ever been known. In the struggle together for the conquest of the air pupils and instructors formed friendships which, despite different walks in life, and even different nationalities, will ever endure. To those who worked at aviation in those days nothing will ever be as fascinating as the technical discussions, after the day's flying, in the "George" at Amesbury, or in the "Blue Bird" at Brooklands; all knew so much and all knew so little, yet all knew that they were helping to build up what would one day be the chief safeguard of the British Isles—its Flying Services. Truly, that happy group of Bristol pilots served their country well.

An Important Offer.

In October a formal offer of importance was made to the Admiralty and War Office alike. The Company undertook to train 250 pilots per annum for each Service, but this opportunity of securing an effective force of Service pilots was declined by each department in turn.

Among the additions to the schools staff in 1911 were Mr. H. R. Busteed (now Squadron-Commander, R.N.), and a fellow-Australian, Mr. Harrison, who is now in command of the Australian Flying School at Werribee, Victoria, as a Captain, Australian Flying Corps.

The Bristol on the Continent.

Bristol machines have always been exhibited at the Paris Aero Shows, but special attention was attracted in this particular year to the firm's products by a performance on the part of Mr. James Valentine (now Major, R.F.C.), who not only flew over to Paris, but also circled the Eiffel Tower. This was the first time a British aeroplane had dared to beard the French aviators in their den, so to speak, and great was the emotion in the city when it became known that the machine at which all Paris had been craning its neck was a British production. The machine flew admirably, and it was not surprising that it attracted much favourable attention from foreign Governments.

In the same month negotiations were opened with the Italian Government, from whom orders for monoplanes were received.

Water Flying.

Before the end of 1911 experiments were undertaken with hydro-aeroplanes.

Being an inland concern, the Company has not developed this particular line to any great extent, but it may be said that the sub-

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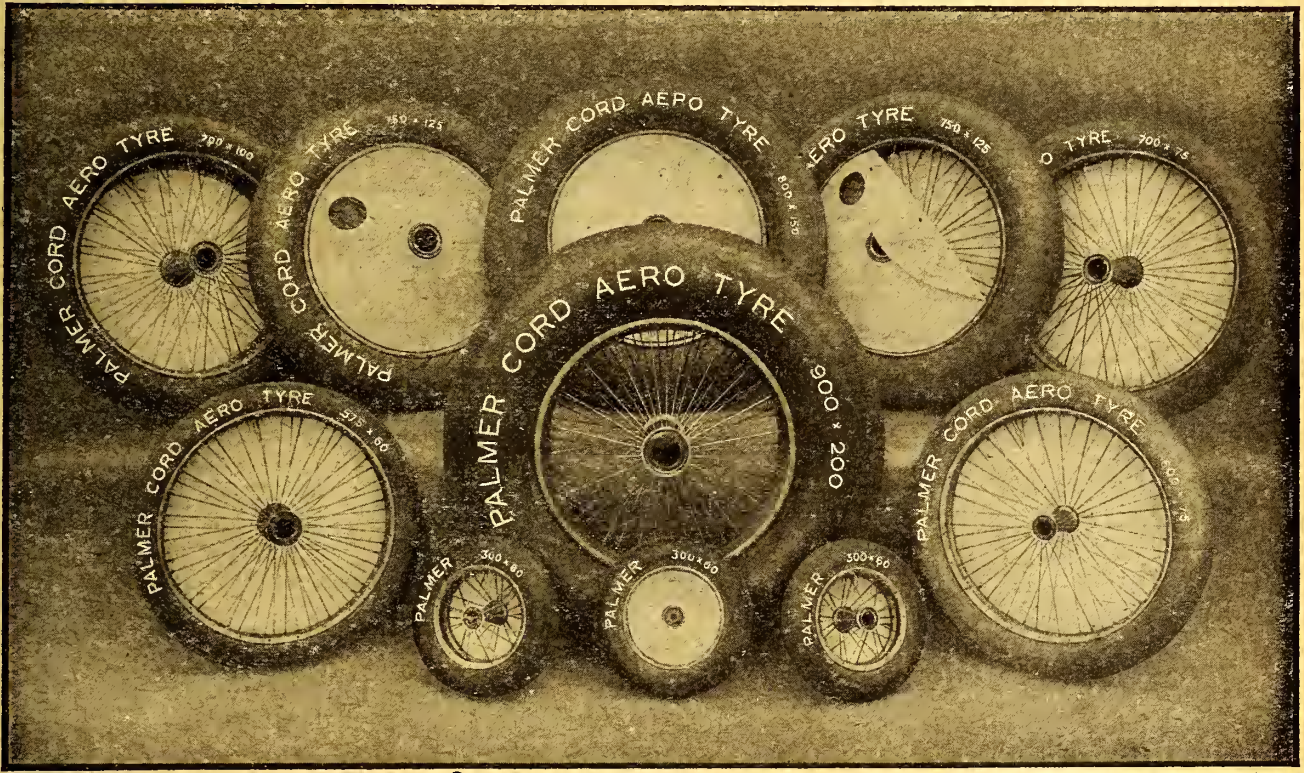
For AEROPLANES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PALMER CORD AERO TYRE 900 × 200
PALMER CORD AERO TYRE 575 × 60
PALMER CORD AERO TYRE 600 × 75
PALMER 300 × 60
PALMER 300 × 60
PALMER 300 × 60

STANDARD SIZES:

Tyre Sizes	Wheel No.	Hub		Track Line
		Length	Bore	
		m/m	m/m	m m
300 × 60	16	111.12	25.4	Central
,,	17	72.39	12.7	Central
450 × 60	30	89,	31.75	Central
575 × 60	14	150,	38.09	104/46
,,	21	160,	28.	Central
,,	34	150,	31.75	104/46
600 × 75	14	150.	38.09	104/46
,,	21	160.	28.	Central
,,	34	150.	31.75	104/46

Tyre Sizes	Wheel No.	Hub		Track Line
		Length	Bore	
		m/m	m/m	m/m
700 × 75	9	178.	44.45	132/46
,,	20	178.	38.09	132/46
,,	75	178.	31.75	132/46
,,	80	178.	44.45	132/46
700 × 100	2	185.	55.	135/50
,,	4	185.	55.	Central
,,	18	178.	44.45	132/46
,,	26	150.	40.	Central
,,	33	150.	38.09	Central
,,	38	178.	38.09	132/46
,,	66	178.	38.89	132/46
750 × 125	2	185.	55.	135/50
,,	4	185.	55.	Central

Tyre Sizes	Wheel No.	Hub		Track Line
		Length	Bore	
		m/m	m/m	m/m
750 × 125	18	178.	44.45	132/46
,,	26	150.	40.	Central
,,	33	150.	38.09	Central
,,	38	178.	38.09	132/46
,,	66	178.	38.89	132/46
800 × 150	8	185.	55.	135/50
,,	10	185.	55.	Central
,,	36	185.	55.	135/50
,,	40	185.	60.32	135/50
900 × 200	42	185,	60.32	125/60
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ject has never been lost to sight, and that the experiments were continued right up to the period of the war, and may yet bear fruit. Although it would be premature to indicate their precise nature, I may mention in passing that they were of a distinctly novel character where design was concerned.

1912 DEVELOPMENTS.

The whole of the year 1912 was remarkable for the variety and extent of the Company's dealings with foreign countries.

Commissions from both Sweden and Russia visited Filton in February, and the training of Italian officers was meanwhile being conducted on a large scale at the Salisbury Plain School.

On its own part, the Company sent a commission to Spain, and demonstrations were carried out before Government officials, and were soon followed by orders for machines.

Then negotiations were opened with the Balkan States. An order was received from the Turkish Government, and Turkish officers were sent over for training in June, soon after which the Bulgarian Government followed suit in each respect. Negotiations were also opened with Roumania, and in September another commission came over from Russia.

The Filton works, in fact, and also the schools, were never without the presence of foreign Government officials, while the Company itself had two representatives actively engaged abroad, one result being the establishment of an Italian agency. A further order, moreover, was received from the Spanish Government.

A regular Bristol School was established at the aerodrome of Cuatro Vientos, a well-named spot on a plateau exposed to all four winds. Here M. Jullerot, Mr. Busteed, and Mr. Pixton at various times did great things on both monoplanes and biplanes. The King of Spain showed great personal interest in the flying, which naturally appealed to his sporting temperament, and it is said that the strongest arguments by his Ministers of State only just succeeded in preventing him from taking the air himself in a Bristol.

MORE GOVERNMENT ORDERS.

As regards home affairs, the B.E. designs were produced by the War Office in June, and an order was placed with the Company for four tractor biplanes of this type and also a Bristol monoplane. Two machines were entered for the Military Trials in July. One was a monoplane designed by Mr. H. Coanda, the son of General Coanda, ex-Minister for War in Roumania. Mr. Coanda joined the staff of the Bristol Co., and remained with the firm until the war. The other machine was a biplane designed by Mr. Gordon England. The monoplane secured the third prize and was taken over by the War Office.

The schools were more active than ever, flights between Salisbury and Brooklands being of daily occurrence. The newer pilots included Messrs. Pixton (now Capt., R.F.C.), Hotchkiss, Fleming, Geoffrey England, and S. V. Sippe, the last named being now Flight-Commander R.N., D.S.O., and one of the heroes of the memorable bombing raid on the Zeppelin sheds at Friedrichshafen in November, 1914.

FRANCE, AMERICA, SPAIN, AND ITALY.

The year 1913 opened with negotiations for the construction of Bristol aeroplanes in France. The United States also displayed an interest in the machines, and tenders were submitted to the American Legation together with an offer to demonstrate in America.

A contract for machines was signed in Madrid on January 16th, and in the same month the construction of machines in series was begun in Italy. Following some trials at Turin, the Italian Government ordered 20 machines.

SPAIN, ROUMANIA, AND AUSTRALIA.

A Spanish commission came over to Salisbury Plain in April, and Prince Cantacuzène, a Roumanian nobleman, was also there in May and June to take delivery of machines for his Government. Before the year closed two B.Es. were dispatched to Australia. These, together with sundry of the older type Bristol "box-kites," for so long the most successful of school machines, formed the nucleus of the equipment of the Australian Flying Corps, which has contributed so many valuable pilots to the Imperial Forces in all war areas.

AN ADMIRALTY ORDER.

At home the Admiralty ordered two machines in January, and a tender for seven B.Es. was accepted by the War Office. In April a new type of tractor, the B.R.7, was put through its trials on Salisbury Plain, and a new 80-h.p. tractor was brought out in the autumn. Some Admiralty trials were held at Eastchurch in November.

JUST BEFORE THE WAR.

In 1914 some tests of the Bristol were made in France by M. Bréguet, and later a new armoured machine was sent over. Commissions also proceeded to Belgium, Norway, and Sweden.

Where home matters are concerned, however, two events are specially worthy of notice. The first was the production in the spring of the since famous Bristol "Scout," from the designs of Mr. F. S. Barnwell (now Capt., R.F.C.), assisted by Mr. Busteed, and the success of the new model was effectively demonstrated by Lord Carbery, who flew one over from Paris.

How valuable those small high-speed scouts have been throughout the war is well known to all flying officers of both Services, and many is the tale that could be told of Hun aeroplanes of superior power and armament brought down by the little machines with the big speed. For a long time the fast single-seater biplane was an entirely British product, and it was only after many months of war flying that even the French began to develop the type. The Germans have only adopted it within the past twelve months.

A PATRIOTIC OFFER.

The second item was the proffering of an important offer to the War Office. Everyone familiar with the inner history of the Aircraft Industry will remember the period of stagnation that prevailed during the first six months of 1914, when aeroplane factories generally were suffering from entire lack of War Office recognition. The British and Colonial Aeroplane Co., for one, was spending a great deal of money without any assistance from the Government, from whom, for many months, not a single order was received. Incidentally, it may be mentioned that out of all the machines built before the war, only a small number had been constructed to War Office and Admiralty requests.

Hardly any more heart-breaking work could well be imagined than the designing of aeroplanes, and getting them broken up, without some measure of official recognition.

On July 2nd, however—and the date is significant in view of what was to happen only a month later—the Company made a formal offer to the War Office to cease building for foreign Governments and abandon all miscellaneous business, and to make the Filton works entirely a Government source of supply, with a guaranteed output of a hundred machines per annum, the proposal being put forward "in view of possible national emergency." The offer was declined, but with a promise to pass on some orders for machines, and a request for more B.Es. followed.

A QUICK CHANGE.

Naturally, a quick change came o'er the scene when war broke out a few days later, and the War Office took over the Brooklands Flying School on August 5th. The Lark Hill hangars had already been acquired in March.

The Filton works, of course, immediately became busy on Government work. With an energetic directorate and an experienced staff, the only thing requisite when the call came for machines in quantities was expansion, and not only were the Filton works greatly extended, but the motor works of the Bristol Tramways and Carriage Co. at Brislington were taken over, and eventually the tramway shops as well. Consequently, for a long time past, the tramcars have had to be housed elsewhere, and virtually shift for themselves in respect of painting and overhauls.

The new premises, which have been erected at Filton, are not only vast in extent, but a model of up-to-datedness in equipment and method. Their control is in the capable hands of Mr. H. J. Thomas.

A VISIT OF INSPECTION.

During the course of a tour of the buildings with Mr. Thomas I saw many things, of course, of very great interest, but this is not the moment at which to enlarge thereupon; but, possibly, an opportunity may be found of returning to the subject later. Enough has been said to show that the career of the British and Colonial Aeroplane Co. has been unique in its variety, and that the country was fortunate in possessing, at the outbreak of the war, an establishment which could boast so many years of practical experience and achievement, coupled with such a high reputation for sound workmanship.

* * *

A NEW HOUSE MAGAZINE.

The Aircraft Supplies Co., Ltd., have joined the little band of aircraftsmen who have adopted journalism as a spare time hobby, and Vol. I, No. 1 of "Aircraft Supplies," is the result. Further issues will appear fortnightly.

The Company's fortnightly stock list has been incorporated in the new magazine, which will ensure it a wide circulation throughout the whole aircraft industry.

The current issue contains a well-illustrated article on the new Avro barrelless turnbuckle, a disquisition upon the art of compiling catalogues, and an article on "Raw Material Stores and Arrangements," by Mr. George H. Mansfield, managing director of the Company.

The proprietors of the Aircraft Supplies Co., Ltd., are to be congratulated upon the enterprise of their production, and one will look forward to further issues with interest.

Copies of "Aircraft Supplies" may be obtained from the Secretary, at 166, Piccadilly, London, W.1.

MR. PICKLES' MOVEMENTS.

Mr. Sydney Pickles intimates that he has resigned his position on the staff of the Wells Aviation Co., Ltd. He has not definitely decided what work he will undertake in connection with the Aircraft Industry in future, but those who wish to communicate with him can do so at the office of this paper, 166, Piccadilly, W.1.

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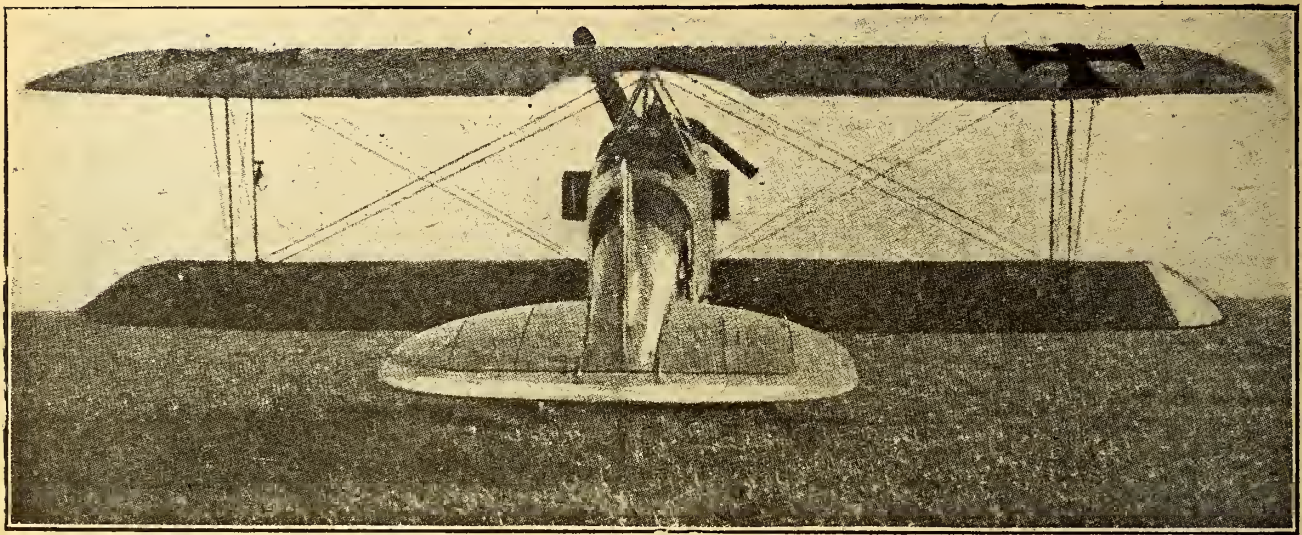
The New Albatros de Chasse.



Reproduced from "L'Aerophile," from a French Military Photograph.
Rear View of the Albatros "D.1.," showing how the top of the fuselage stays the elevator spar.

Thanks to the courtesy of that excellent French paper, "L'Aérophile," it is possible now to publish in this paper descriptions of the Albatros biplane as used during the war. The indebtedness of the British Aircraft Industry is again expressed to M. Georges Besançon and his able contributor M. Lagorgette for the following description of the new Albatros Destroyer. A side view of this machine appeared in The Aeroplane recently, but no detail particulars have hitherto been available.

The Albatros Destroyer is known as the "Type D.1," and the example illustrated, D.1/391-1916 (Factory No. 2944), was shot down about Dec. 1st, 1916, on the British front. Another of the type, D.1/497/16, is found to be identical in type.

General Characteristics.

In numerous ways the D.1 preserves the characteristics of the "general purpose type," C.III, but in other respects it resembles closely the French war machines. It retains the wing curve of the old Albatroses, but with less chord, less spar depth, and less under-curve.

The construction of the fuselage is entirely of wood, overlaid with three-ply.

The under-carriage and cabane are of the usual Albatros type, and the motor is a Mercédès of 170 h.p.

From the Fokker it has copied the control-lever and a system of controlling two parallel machine guns, which, incidentally, are not parallel, but concentrate at a point something about 100 yards in front of the machines. Nevertheless the machine is distinctly of French inspiration.

The Albatros Destroyer imitates from the Allies' machines the small size, the wings without V and without "arrow," the stagger, and the small angle of incidence; also the non-lifting tail plane, the oval monocoque fuselage, and the cap over the propeller boss in front. The entire absence of dihedral angle and arrow shape in the new Albatros is the first example of this principle in Germany.

Chief Dimensions.

The total length of the machine is 7.3 metres; fuselage 6.5 m.; elevator 0.5 m.; propeller cap 0.3 m.; the height of the top of the wings is 2.9 m.; but the propeller circle reaches a height of 3.1 m.

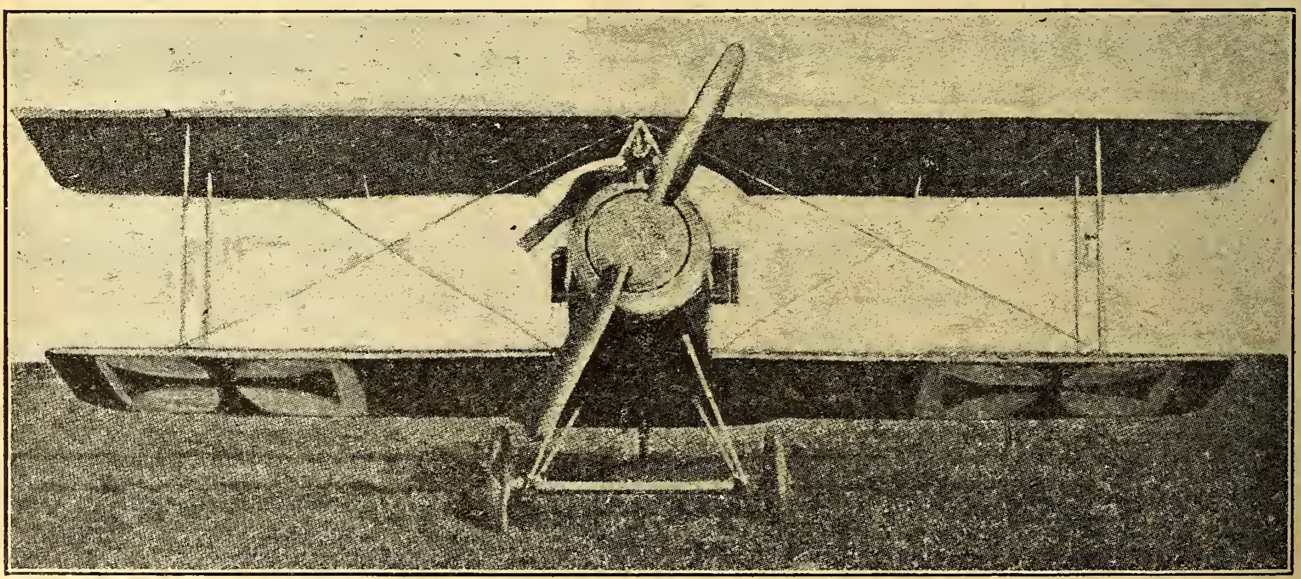
Wing Characteristics.

Wings.—The angle of incidence near the fuselage is 5.3 deg., or about 145 mm., which decreases progressively to 4 deg. at the outside rib of the lower left wing and to 2 deg. at the outside rib of the lower right wing, or about 57 mm. The wings are thus "washed out" and their curve flatter than that of the C.III, the ribs varying from the inner to the outer ribs.

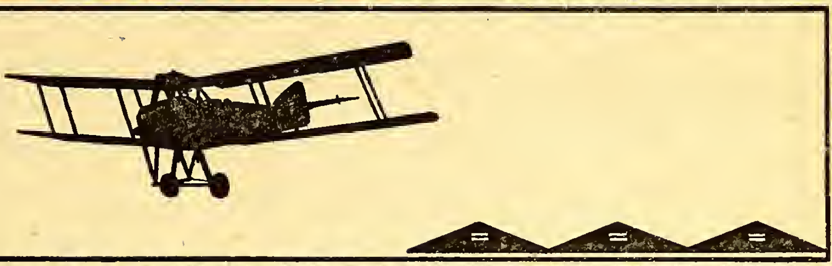
An interesting point is that the wings can be more or less staggered as required. The lower wings are fixed in relation to the fuselage, but the upper wing can be either placed exactly over the lower or staggered forward. For this purpose the horizontal longitudinal tube which forms the summit of the cabane is pierced at each extremity with five holes spaced over a distance of 12 cm., within the limits of which distance the two bolts fixing the upper plane can be altered in position. This arrangement is probably made so as to alter the centre of pressure to allow for alterations in the size and weight of the engines used, and also possibly for the weight of the pilot. The centre of pressure is thus shifted longitudinally, and the weights correctly adjusted instead of adopting the usual principle of merely adjusting the angle of the tail.

The lower wings are equal in chord (1.62 m.) to the upper wings.

The gap between the planes is 1.15 m. along the line of the



Reproduced from "L'Aerophile," from a French Military Photograph.
Front view of the Albatros "D.1.," showing the sideways exhaust pipe and the lop-sided radiators.



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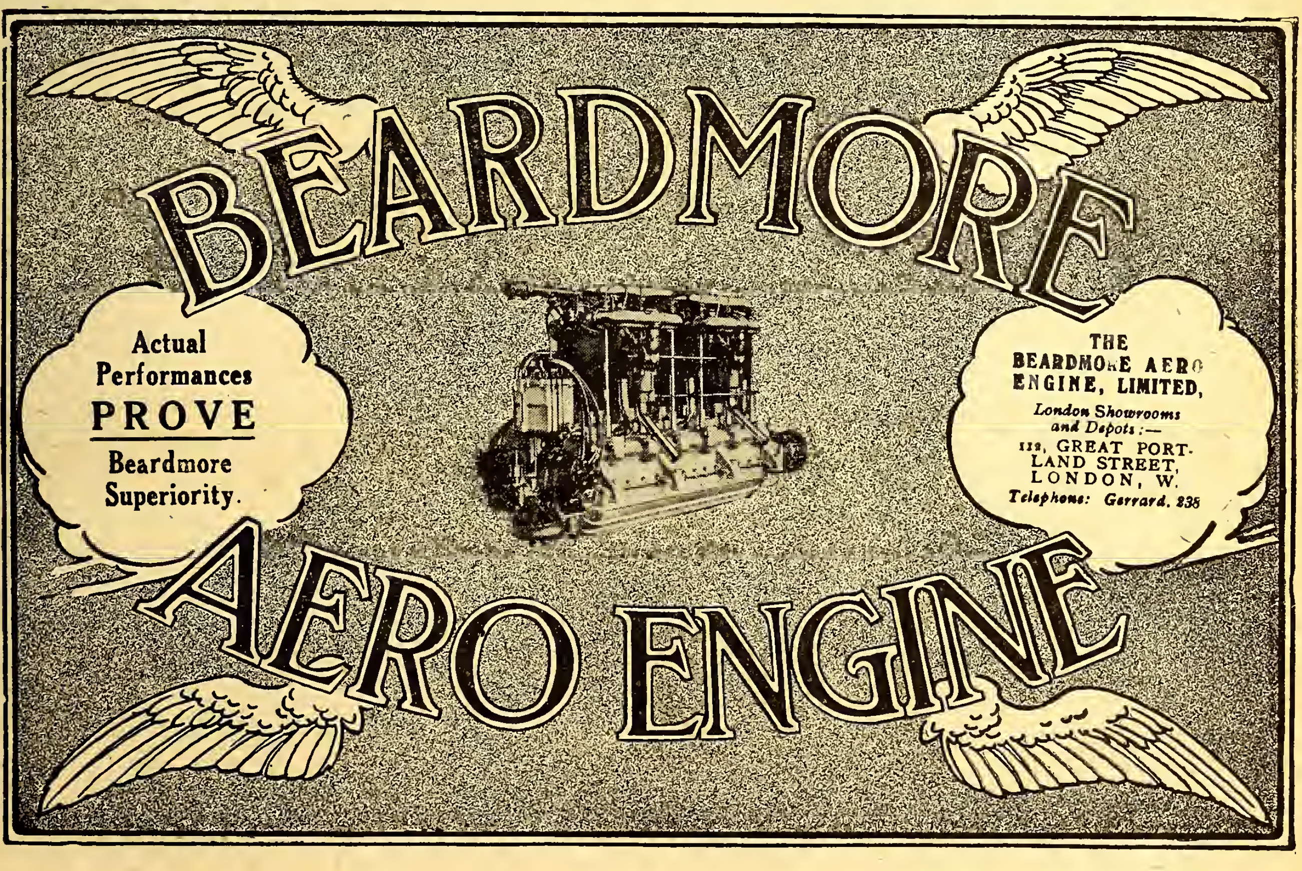

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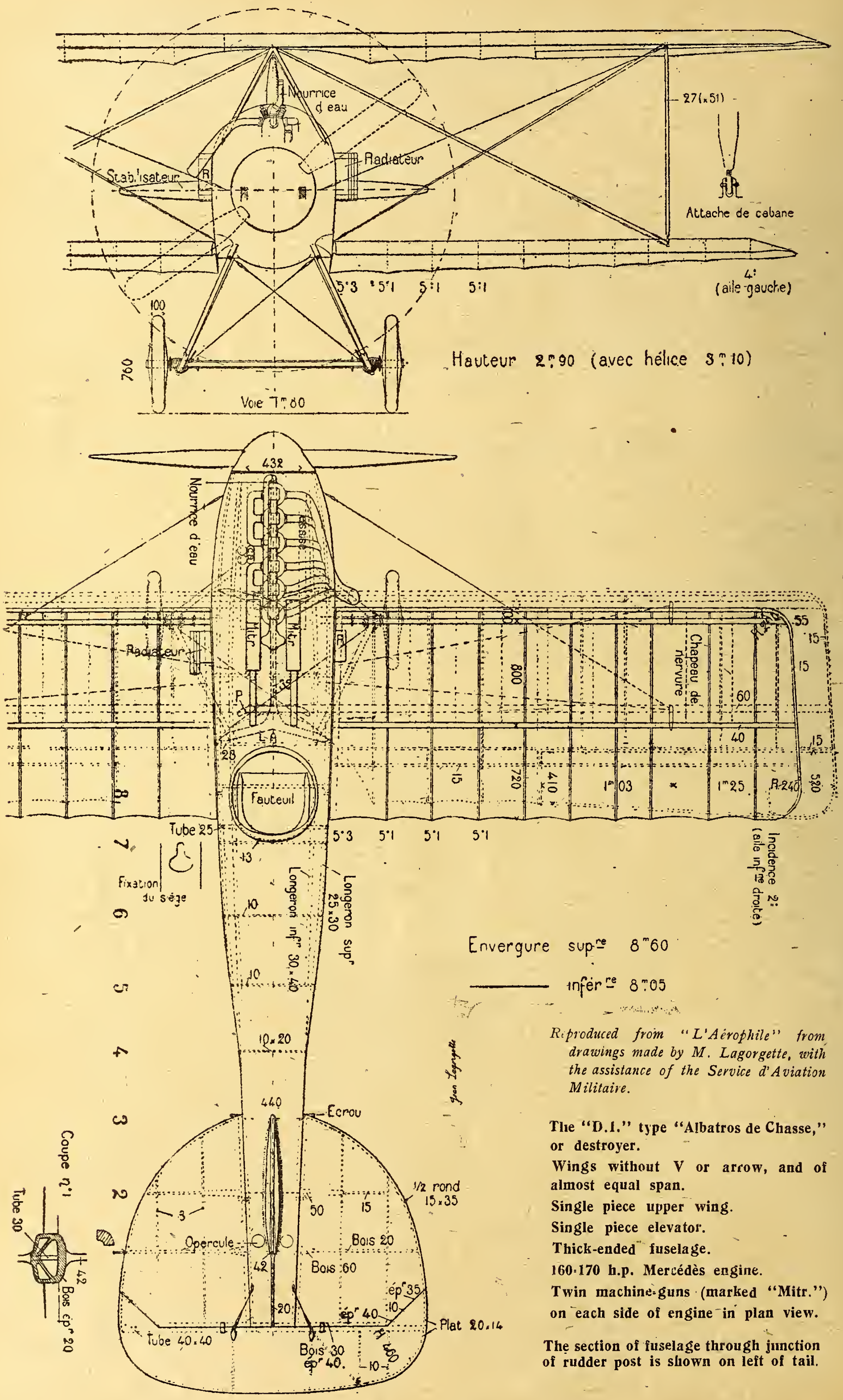


Reproduced from "L'Aérophile" from drawings made by M. Lagorgette, with the assistance of the Service d'Aviation Militaire.

The "D.I." type "Albatros de Chasse," or destroyer.

Wings without V or arrow, and of almost equal span.

Single piece upper wing.

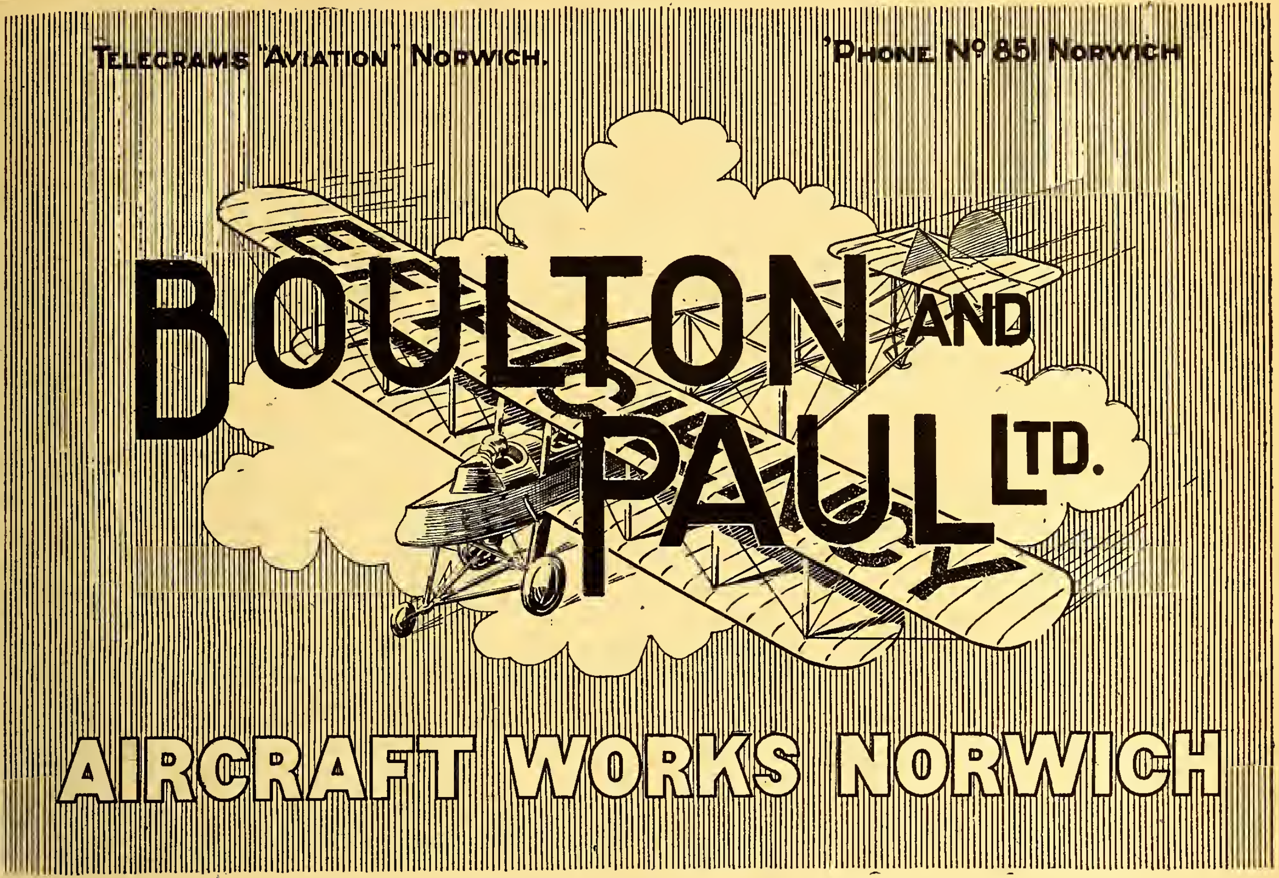
Single piece elevator.

Thick-ended fuselage.

160-170 h.p. Mercédès engine.

Twin machine-guns (marked "Mitr.") on each side of engine in plan view.

The section of fuselage through junction of rudder post is shown on left of tail.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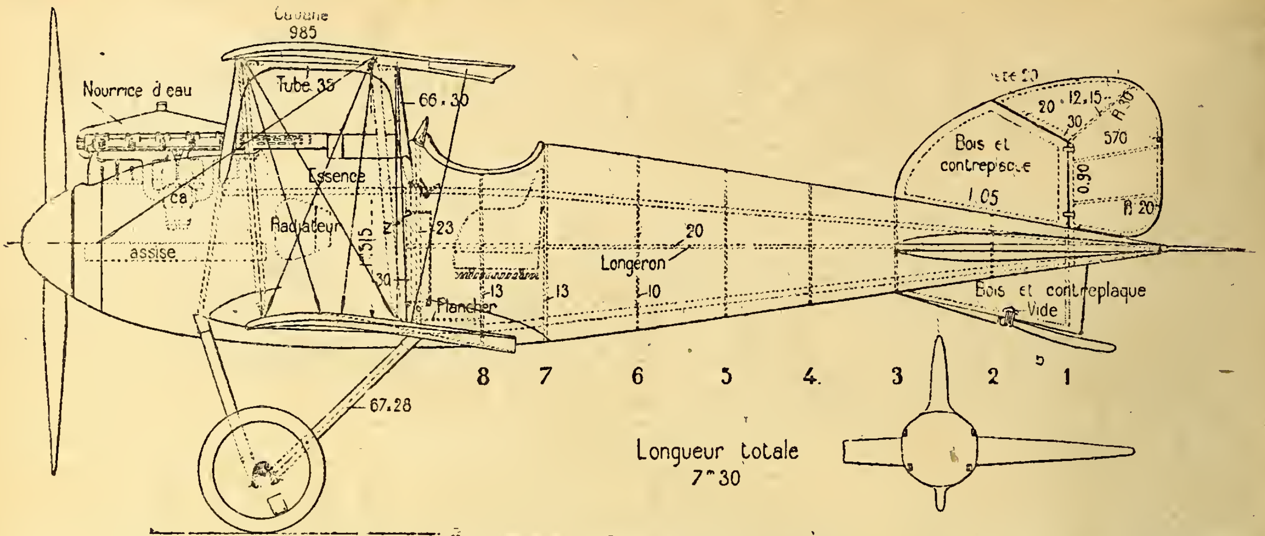


Side View of "D.1." Albatros. The immense thickness of the tail plane should be noted. Also the great vertical area aft, together with the fact that the rudder post is fixed into the thick part of the fuselage. The section shown in the right bottom corner is that of the fuselage where the tail-plane is thickest.

interplane struts. The span of the upper wings is 8.6 m., and the lower wings 8.05 m., the difference being hardly appreciable.

The total surface, including ailerons, is 25 sq. m. (13.5 sq. m. + 11.5 sq. m. for the upper and lower wings respectively). The upper wings are cut out in a semi-circle behind, above the pilot's seat.

The Ailerons are on the upper wing only and are "washed out" towards the tips. The outer edge slants off rearward. As in the other Albatroses, they are not fixed to the main rear spar, but to a third subsidiary spar behind it. The ailerons measure 2.38 m. in span by 0.41 m. to 0.52 m. chord, and so altogether occupy about half the span of the machine Their surface is 1 sq. m. each.

The lower wings are fixed to the fuselage on a bracket which sticks out beyond the rounding of the monocoque.

Contrary to the custom of all German biplanes, the upper plane is a single unit instead of being divided into two separate wings. Each of its two spars is pierced vertically by a bolt which can be fixed in one of the five holes of the summit-tube of the cabane. As in other Albatroses, the two main spars are placed near the leading edge, the front spar being 100 mm. from the edge and the rear spar 0.8 m. behind it. There is thus a trailing edge with 0.72 m. overhang, in which the ribs are linked together by a third spar, 15 mm. square in section, which is not attached in any way to the fuselage or the cabane.

The spars, like the wings, finish with an outward slant, and are bevelled off sharply on the top side.

The ribs are spaced regularly 415 mm. apart in the upper wings and 350 mm. apart in the lower wings, except at the interplane struts, where the rib is displaced, owing to the presence of a compression strut, but where the total interval between the two neighbouring ribs nevertheless remains at 700 mm. Between each two ribs a lath extends from the leading edge to the rear spar on the upper face of the wing.

The rest of the internal structure of the wings and ailerons is similar to that of C.III.

CELLULE STRUCTURE.

Unlike any of the other older German machines, the Albatros Destroyer has a single pair of interplane struts of streamline section on each side of the fuselage, these struts being parallel to one another and not diverging as in the C.III type.

Owing to the rigging being much less complex than in the bigger machines, these struts are simply clamped to a metallic attachment without the bell-top socket arrangement of the bigger machines.

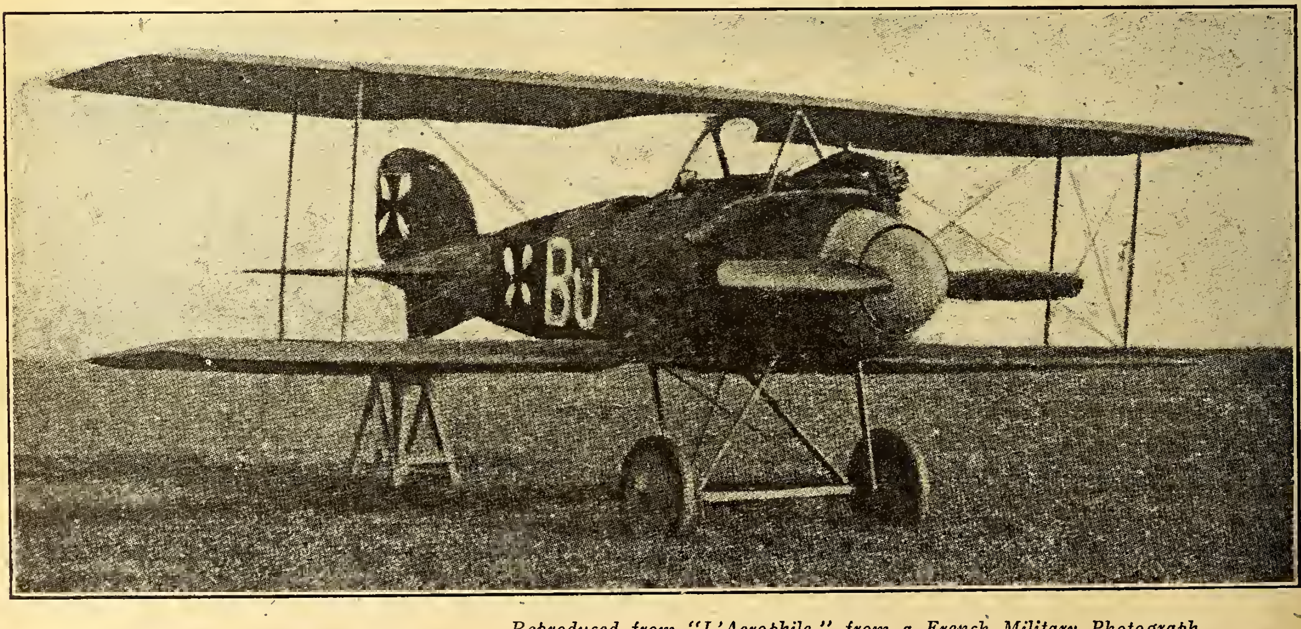
The cable from the front of the engine bearers to the top of the rear interplane strut on each side is retained. There is also a lift cable to the tops of each of these struts springing from a point on the lower longitudinal of the fuselage a little in front of the rudder bar.

The fabric of the wings, like the fuselage covering, is painted green and red-brown on top, and pale blue below, in a manner similar to other German destroyers.

TAIL ARRANGEMENT.

Tail.—As in the C.III Albatros, the fuselage terminates aft in a T shape, which gives an anchorage horizontally to the tail controls, and because of the enormous thickness (150 mm.) of the fixed tail planes and the fitting of the vertical fin forward, where the fuselage is still very thick, the designers have done away with the usual strengthening brackets on the fixed tail plane, which is large and rounded off.

Its two parts, without counting the interposed portion of the



Reproduced from "L'Aerophile," from a French Military Photograph.

Three-quarter Front View of the "D.1." Albatros, showing the excellent streamline shape, and the diminution of head-resistance achieved.

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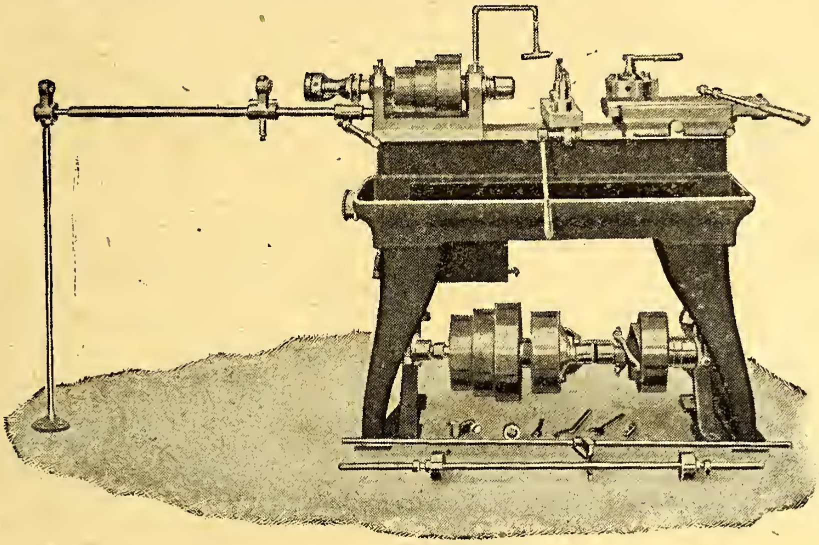

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fuselage, have a surface of 1.4 sq.m., or of 2 sq. m. including the fuselage. This tail plane has no angle of incidence, and is placed exactly in the line of flight.

Elevator and Fins.

The elevator, contrary to all preceding machines, is a single unit, and is balanced by two small triangular parts projecting forward on the elevator hinge. The surface is 1.1 sq. m., including 0.08 sq. m. of the balanced section.

The fixed vertical fin is rounded as to its upper edge, as in certain British machines. The supports of the tail skid form, underneath the fuselage, another tail fin, but less deep than the one above, and longer.

The surface of the two fins is about 0.8 sq. m. (0.55 above and 0.25 below). Both are permanently fixed to the fuselage, and their junction is rounded off by three-ply, with which they are covered. Their framework, like that of the tail plane, is of wood, contrary to general German practice. The elevator and rudder frames are built of tube covered with fabric.

The Rudder.

The rudder is balanced by a prolongation in front of the rudder post. The rear edge of the rudder is vertically above the extremity of the fuselage, consequently the rudder post finds solid attachments within the thick part of the fuselage. This disposition also permits all the control cables to be kept underneath the tail planes. The surface of the rudder is 0.55 sq. m., including the balanced portion of 0.08 sq. m.

Although the exterior of the machine appears somewhat rough, all the internal woodwork and tubes are most carefully finished, and the thickness of the different parts is varied carefully from one extremity to the other.

Fuselage Arrangement.

Fuselage.—The length is 6.5 m.; maximum depth 1.5 m.; and the maximum width 0.93 m.

The section is more or less rounded from front to rear, in the whale shape now adopted by the Germans from the French.

In front the motor is placed as in other biplanes, but owing to the overall shortness of the machine, is not entirely in front of the wings. Between the wings and inside the fuselage is the tank, which is almost cylindrical.

Under the trailing edge of the upper plane the pilot is seated in a chair fixed on two transverse tubes of 25 mm. diameter, which are adjustable longitudinally. These transverse tubes are placed on false longerons pierced with vertical holes, the forward transverse tube being bolted into one of these holes and the rear one merely holding by pegs.

The cabane is arranged as in the C.III type; the base of the aft legs being in line with the aft legs of the under-carriage, with the prolongation of the forward legs running down to the front of the under-carriage along the sides of a wooden partition.

The cabane is longer on top in proportion than in other machines, to allow for the wing adjustment, and when the upper plane is staggered as far forward as possible the rear end of the cabane sticks out into the cut-away portions of the wings.

Structure.—As in all previous Albatroses, the fuselage has six longitudinals, two of which are smaller than the others and are fixed half-way up the sides. The two upper longerons are not exactly above the lower ones, but are distinctly wider apart. All the longitudinals are of spruce except the fore part of the two lower ones, which are of ash as far back as the pilot's seat, where they are 40 mm. deep and 30 mm. thick. As in other machines, they are wrapped spirally with fabric.

To these longerons are fixed simple transverse frames without cross struts and hardly deserving the name of formers. These form the body of the monocoque, and onto them are nailed the three-ply sheeting which covers it. These frames, which are reinforced where they join the longerons, are less numerous and are lighter than in the C.III, and are composed of simple laths 20 mm. by 10 mm., rounded on their interior face. Where the tail plane and the fin are fitted in there are two transverse formers in thicker wood.

Unlike the C.III type, there is neither cable nor piano-wire nor tube in the fuselage, which depends entirely on the three-ply casing for its strength.

The Landing Chassis.

Under-carriage.—The under-carriage is identical in design with that of the C.III, and is about as tall, though owing to the small track between the wheels, 1.25 m. at the axle, and 0.6 m at the fuselage, it appears taller. The actual wheel track is 1.8 m. The cross-bracing cables are between the rear struts, and not between the forward struts as in C.III, and there is no claw brake.

The Engine.

Motor.—The motor is a 6-cylinder Mercédès. On the D.1/391, this was numbered 27,911 and gave 170 h.p. of 1,450 r.p.m. The air-screw is of a slightly modified design, and has a diameter of 2.8 m.

The exhaust pipe is built up in the same way, but it is pointed obliquely backwards and forwards. The two radiators are of a new form, and are fixed one on each flank of the fuselage outside, one being thicker horizontally than the other. Their position necessitates a gravity tank, flat and triangular, which is situated above and to the left of the cam-shaft. The air-pump, as in other biplanes with machine-gun in front, is fixed above the front of, and not behind, the cam-shaft.

Controls.

Control Gear.—The elevator and aileron control is by means of a lever of 30 m. tube with two handles, almost vertical and parallel, mounted on a cross tube of 40 m., which is fixed on a wooden base.

This lever has an auto-lock by means of three small tubes, forming an articulated parallelogram, which can be locked fore and aft by a small handle. Thus the lever can be worked laterally between the knees for the ailerons, and held rigid in reference to the elevator, so that the pilot thus has his hands free for the use of the machine-guns.

The rudder bar is mounted on the summit of a pyramid of three tubes.

The elevator control cables are inside the fuselage for almost the entire length, and only emerge close to the elevator cranks. The rudder cables are inside the fuselage for their whole length, for, owing to the rudder being placed so far forward, the rudder post and its cranks are themselves inside the fuselage, which is distinctly contrary to general custom, and is an excellent idea. The aileron cables are inside the lower wings, and only open to the air between the wings.

Armament.

Armament.—The armament of this machine will be discussed specially in conjunction with that of various other German machines, but it is worth while to state here that it carries two machine-guns, one at each side of the engine, the fire of which converges some distance in front of the machine. The instruments are less numerous than on the big biplanes, and are apparently not fixed on a special instrument board. They include a starting magneto, a rev. counter, a pressure indicator, a compass, which is carried in the fuselage and not in the wings, as in other machines, and an air speed indicator.

M. Lagorgette states that, though the Albatros Destroyer is somewhat massive and heavy, owing to the weight of its motor, and has not the speed range of the Nieuport, Morane, Spad, or Sopwith, it is very handleable, and its armament makes it an adversary seriously to be considered.

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Which faith except everyone keep it whole and undefiled, without doubt he shall everlastingly be on fatigue.

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Neither confounding its qualities nor noticing its faults.

For there is one fault the power and there is one fault the cooling and there is one fault the lubrication.

But the failing of the power and cooling and lubrication is all one, inevitable and incorrigible.

Such is the power and the cooling and the lubrication.

The power non-existent the cooling non-existent and the lubrication non-existent.

The power incomprehensible, the cooling incomprehensible and the lubrication incomprehensible.

The power an error the cooling an error the lubrication an error.

As also there are not three incomprehensibles nor three non-existents but one R.A.F. engine incomprehensible and non-existent.

For like as we are compelled by factory truth to acknowledge every quality by itself.

So are we compelled by the factory faith to say that there are neither three errors nor three incomprehensibles.

The power is not of petrol neither given nor likely to be and the cooling is like the power alone.

For the lubrication is not of oil but of molten white metal.

And the cooling is of air by the lubrication not taking place but overheating.

And the power is of the lubrication and the cooling neither existing nor given unto the others.

For the lubrication cracketh cylinders and the cooling cracketh cylinders and yet there are not three cracked cylinders but eight cracked cylinders.

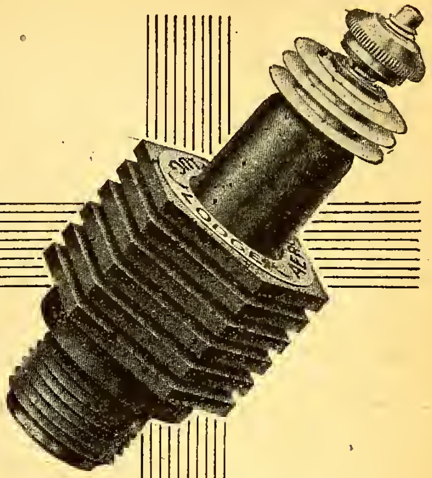
And the lubrication burneth valves and the cooling burneth valves and yet there are not two burnt valves but sixteen burnt valves.

And the lubrication runneth bearings and the cooling runneth bearings and yet there are not two running bearings but all the runnable bearings of the engines.

Moreover it is especially necessary to believe in the work of our Royal Aircraft Factory of wages enormous but labour insignificant.

Such is the Factory Faith.

Glory be to the power and the cooling and to the lubrication. Which helped to keep us on the ground in the beginning and will continue to do so until it is replaced.—Amen.



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THEORIES ON AEROFOILS.

The second of the series of ten educational lectures on aeronautics, under the auspices of the Aeronautical Society, was given in St. Peter's Hall, Cricklewood Lane, on Thursday last, March 8th, 1917. The subject of the lecture was "The Aerofoils and Fluid Flow Round Bodies," and, whether it was a peculiar suggestiveness about the title, or some other cause not so easily discoverable, the fact remains that the attendance was greater than at the initial lecture of the course.

Mr. F. Handley Page, who is very largely responsible for the initiation of the lecture series, presided, and at once put the lecturer, Mr. E. S. Relf, A.R.C.Sc., of the National Physical Laboratory, *en rapport* with the audience in his usual felicitous manner. Mr. Page referred in his remarks to the scheme that is afoot to establish a local branch of the Aeronautical Society in the London home of the aircraft industry, and it is pleasing to note that the co-operation of the principal firms in the district has been secured in the carrying out of this very excellent idea.

The lecturer commenced by describing the buildings and aerodynamic research equipment of the National Physical Laboratory. It was interesting to see how the original modest apparatus for empirical investigation of this kind has grown in half a dozen years, until the buildings devoted to aeronautical experiments and the staff engaged in the experiments form almost the major portion of the Laboratory's resources.

The lecturer explained the general order underlying experiments on aerofoils, and proceeded to describe the instruments used in measuring lift and drift, terms the meaning of which had been carefully elucidated by Mr. Cooper in the first lecture of the course. It is to be feared that, although the lift and drift balances were fairly easy to understand from the description and the slides shown, the methods of determining the moments of couples acting on the aerofoil or aeroplane model about these mutually rectangular axes were not as easy to follow. One suggests that a very simple skeleton model of the apparatus would have been very useful in helping the audience to see the ideas underlying the operation of the more exact instruments.

The lecturer showed how the lift and drift varied with the velocity of the wind past the aerofoil in the tunnel, illustrating his points by a most comprehensive series of curves In this connection he made some reference to the principle of dynamical similarity originated by Newton and elaborated as regards its aeronautical significance by Lord Rayleigh.

It is to be regretted that this extremely useful principle that is so much employed in the shipbuilding industry, and finds no less important a sphere of applicability in aerodynamics, is not more widely known and generally employed, for the utility of dimensional theory, of which this is a particular instance, is not sufficiently well appreciated.

The lecturer drew attention to the uncertainty attending the values of lift effects with large angles of attack for any given wind velocity, and then devoted some time to the consideration of the effect of position of maximum ordinates in planes of constant camber. Here, again, a region of instability is to be noted, and the lecturer pointed out how the practical rules governing design of planes are deduced.

The lecturer subsequently devoted some time to considerations of the position of the centre of pressure in an aerofoil, and showed how its position tended to advance towards the leading edge. He was thus led to hint briefly at the pitching movements associated with this movement of the centre of pressure and the way in which longitudinal stability is partly secured by the provision of tail planes.

The effect of shape of section on strut resistance was touched upon, and the lecturer showed some very interesting slides taken from photographs of the flow of water round spherical obstacles, in which the growth of eddies in the liquid was very beautifully seen.

[One is inclined to doubt the value of experiments in an incompressible and inelastic fluid, as water, in relation to a highly compressible and elastic fluid, as air.—Ed.]

The lecturer devoted a brief space to the consideration of the mutual effect of the two planes of a biplane, and showed how the lift differed or agreed with the sum of the individual lifts according as the distance between them was smaller or greater than a certain value.

The Chairman, in opening the discussion, made comment on the recent types of American triplane, which may possibly be a coming machine. The number of subsequent speakers was surprisingly small in view of the size of the audience, and one thinks that perhaps discussion would be stimulated if a précis of the lecture were available for the use of, say, the members of the projected local society prior to the meeting.—H.H.

"AIRSCREWS."

The third of the Aeronautical Society's Lectures at St. Peter's Hall, Cricklewood, had for its subject the fascinating question on "Airscrews," the Lecturer being Mr. A. Fage, A.R.C.Sc., of the National Physical Laboratory.

There was again a large audience.

The Chairman on this occasion was Mr. C. Grahame-White, who made a very interesting opening statement, in which he expressed his great appreciation of the Aeronautical Society's action in providing this course of Educational Lectures, and gave it as his opinion that the inclusion of Aerodynamics in the curriculum of our Public Schools and Universities would prove of much greater value to the students than such subjects as Latin and Greek. He was particularly gratified that the Aeronautical Society should have chosen the Hendon District as a centre for these lectures, and pointed out that the "wild and fantastic dreams" he had had in the early days of aircraft manufacture, of Hendon becoming the Charing Cross, so to speak, of the Aero World, were getting nearer to realisation every day.

He reminded the audience how the new struggling industry of aeroplane manufacture had been on the "verge of starvation" just prior to the outbreak of war, and now that the nation had awakened to the far-reaching effect the use of the aeroplane had had in this war, he trusted that when the cry for economy, which would inevitably follow the declaration of peace, came, it would not be allowed to retard the progress of the British Aeroplane Industry, either for war or commercial purposes.

Another point touched on by Mr. Grahame-White was the fact that the invaluable research work in Aerodynamics, which was being carried out at the National Physical Laboratory, was not more easily accessible to aircraft constructors.

He felt that the wonderful testing plant, and the scientific data which had been accumulated there, should be available for the use of British aircraft constructors, or failing such arrangement, that the newly formed Society of British Aircraft Constructors should found for its members a proper research centre, with all the necessary plant.

Mr. Fage then led the audience through the mysteries of the propulsion of aircraft by means of the Airscrew. His remarks were well illustrated by means of a number of excellent lantern slides, containing the usual assortment of curves, but I am sure that the audience heaved a sigh of relief when the lecturer reached that descriptive part of the lecture, where he explained the various devices used in the experimental work at the National Physical Laboratory. I should like to point out here the extreme necessity, if these Educational Lectures are to be of any value to the rank and file of those employed in the Aircraft Industry, of cutting out, as far as possible, the mathematical part of the subject, because one must bear in mind the fact that 90 per cent. of those who attend these lectures in search of knowledge have never been initiated into even the very elements of mathematics, although they may know as much, perhaps even more (though let us say it with bated breath), about the practical side of the subject than the lecturer himself. As one member of the audience put it in the very interesting discussion which followed the lecture, "Some of the mathematical portions were a bit thick for a popular lecture," and even the Chairman had to admit that a great part of the lecture was "quite over his head." In spite of this, however, there was no doubt about the appreciation of the audience, as witness the enthusiastic response to the usual vote of thanks.

The next Lecture of this series will be held in the same Hall on Thursday next, the 22nd inst., and will be given by Capt. F. S. Barnwell, R.F.C., the subject being "The Modern Aeroplane." The Chair, on this occasion, will be taken by Capt. G. de Havilland.—H.H.

THE AFFAIRS OF THE WELLS AVIATION CO.

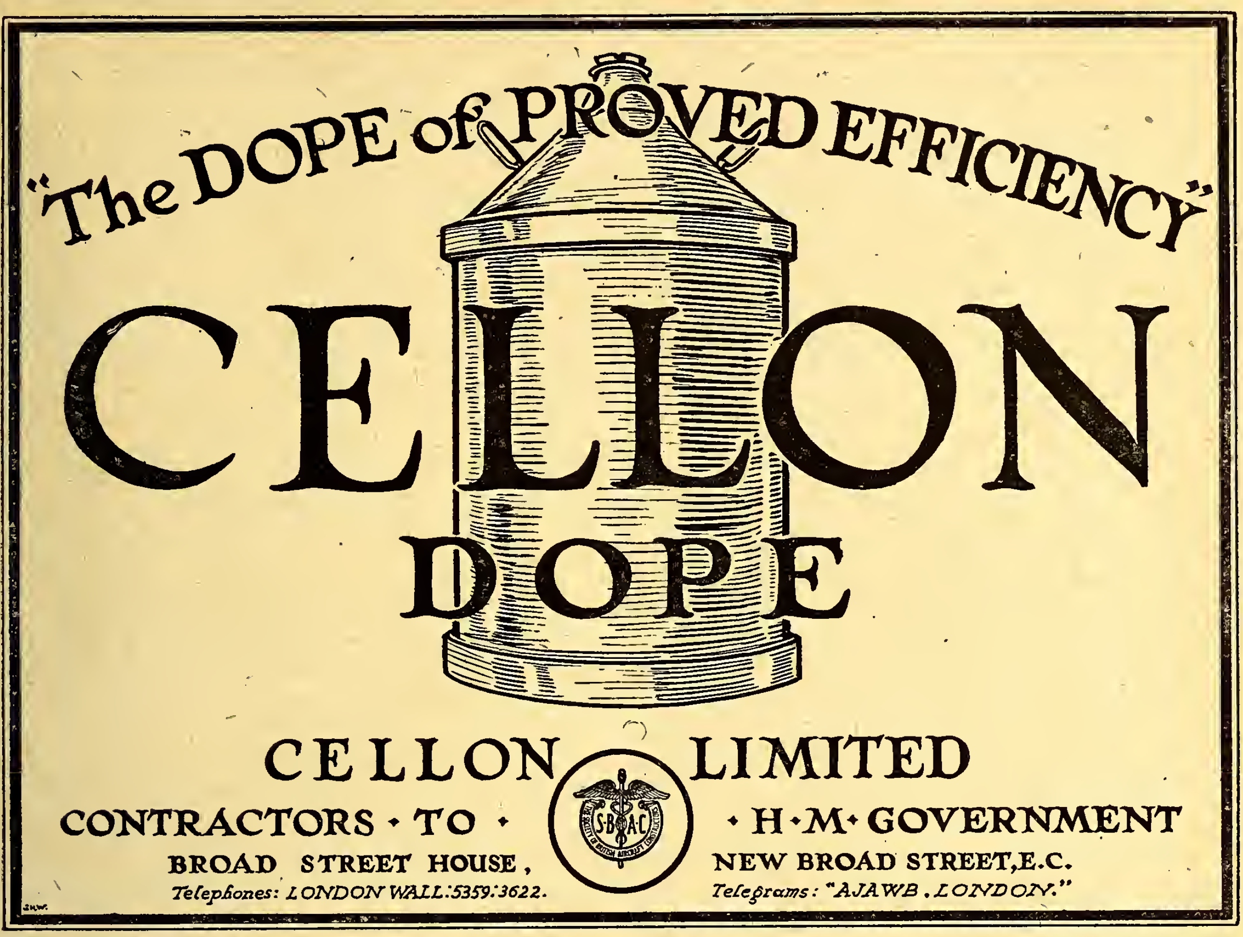
Some considerable gossip has been caused in the Aircraft Industry by the fact that a receiver and manager has been appointed to take charge of the Wells Aviation Co., Ltd., on behalf of the War Office, as Debenture Holders.

Mr. D. L. Honeyman, the aforesaid receiver, has issued a statement notifying his appointment, adding that he understands that the Company hoped to put forward a scheme which will enable the business to be carried on, but that in the meantime there are not sufficient funds available for the payment of the unsecured creditors.

It may seem curious that a firm which is brimful of work should have to suspend payment, but a little knowledge of facts explains why, and at the same time makes it clear that a perfectly solvent firm may be hard up for ready cash. The Wells Co. started as sub-contractors only, receiving payment weekly for work done. The satisfactory quality of this work led to increases of orders, and to the placing of orders for complete machines. This again led to the erection of buildings and the laying down of plant. Wages had to be found for upwards of 2,000 hands, assembled from all sorts of trades and trained by the firm. All this meant a large outlay of money without any great income, pending the delivery of complete aeroplanes in quantities, with the result indicated above.

A visit to the firm's various shops shows that good work is being done in the national interests, and that this work is being produced under very economical conditions as regards overhead charges. Therefore one can well believe that the firm is actually producing at a profit, even though all that profit is locked up in the increasing amount of material and labour employed.

The War Office evidently believes in the firm, seeing that fresh orders are continually being placed, and that financial aid has been given, in the shape of Debentures, therefore there seems good reason to expect ultimate success, either through the acquisition of fresh capital, or (in a longer period) through the accumulation of profits.



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ON TUNING GNOMES.

With each form of locomotion there has arisen two grades, the mediocre and the thoroughbred. This is true of the human pedestrian, the swimmer, the horseman, the ship, and even the aeroplane and its engine. The mediocre man will carry on in spite of himself, and so will the mediocre horse and vessel. The thoroughbred will perform twice as well as its less favoured contemporary, but will demand four times the care. This is nowhere more true than in the case of the aero-engine, for where ultra-efficiency is demanded and exacted the price must be paid in careful upkeep.

It will hardly be contradicted that the 100-h.p. monosoupape Gnôme is the most effective low-powered aero-engine in the world for its weight; and, as such, due respect must be paid to its relatively light construction. Lack of attention in cleanliness and general handling in the maintenance of tune in any aeroplane engine is most reprehensible. In such an engine as the Gnôme it is little short of a crime, when it is remembered what disastrous results may be caused by engine failure on active service.

As the R.N.A.S. and the R.F.C. have reached such large proportions in such a short time, it is not surprising that rather more than a modicum (whatever a modicum may be) of the mechanics enlisted in the past are "mugs" (for want of a better word), and the result is that many monosoupape Gnôme engines have been ruined because of treatment which would have been rough on the heaviest Diesel engine that was ever turned out.

A typical example of the sort of treatment meted out to some of these unfortunate engines was as follows:—

An engine returned to the Gnôme Co. for overhaul, suffering from big-end seizure, was taken to pieces, and it was discovered that the wrist-pins which attach the crank-end of the connecting-rods to the end of the master-rod had been so fitted by the mechanics during a previous overhaul that no oil could reach the bearings. Now these wrist-pins are provided with oil-ways which are supposed to link up with oil-ways in the bushes of the connecting-rod bearings, and in order to prevent the wrist-pin from turning round in its bush the Gnôme Engine Co. have considerately provided a "snug," or key, in the side of the wrist-pin and a corresponding recess in the master-rod bush, to prevent it from turning round.

It is hardly credible, but none the less true, that the mechanic who had re-assembled this particularly unfortunate motor had pushed the wrist-pins all anyhow through the bushes in the master-rod, and, finding that the snugs prevented him from pushing the pins right home, had simply taken a hammer and banged at the end of the wrist-pins until the snugs had fallen off and the pins had gone right in!

It was therefore not surprising that the oil-ways did not link up, and still less surprising that the engine seized.

Countless crimes of the same nature have been committed upon the highly delicate mechanism of the monosoupape Gnôme, which accounts for various libellous letters from equipment officers and squadron commanders and other people whose word is law. The makers, therefore, decided to issue an instruction book, showing the proper way to care for the engine. If these instructions are carried out in strict rotation by anyone possessing the remotest bent for mechanics, there is no reason why the monosoupape Gnôme should not be as reliable and as satisfactory all round as any other aero-engine.

The contradictory reports one receives of the usefulness of the monosoupape is a matter little less than extraordinary. There is no doubt, however, that the squadrons that get good results out of this engine are the squadrons where the mechanics understand how to handle it. The squadrons who experience trouble must lack experienced mechanics, because the Gnôme is one of the best engine creations of the time, and, as it has been clearly demonstrated, to keep it up to its work is merely a matter of proper care and attention.

The "Gnôme Mono" Instruction Book is a tasteful production of 240 pages, artistically bound, and well printed on art paper. The engine of which it treats is the 9-cylinder Type B.

The sections of the book are as follows:—

Part I.—General Description; Construction; Cycle of Operations.

Part II.—Timing of the Engine; Valves; Ignition.

Part III.—Erection of Engine in Machine; Dimensions Required for Housing; Petrol System and Connections; Lubricating System and Connections.

Part IV.—Running of Engine; Starting in Flight; Regulation of Petrol.

Part V.—Dismantling of Engine.

Part VI.—Cleaning and Re-assembling.

Part VII.—Storage and Dispatch.

Part VIII.—Recent Alterations; Air Pump Lubrication; Connecting Rods; Exhaust Valve Spring; Tappet Rod Fixing; Removal of Engine from Plane.

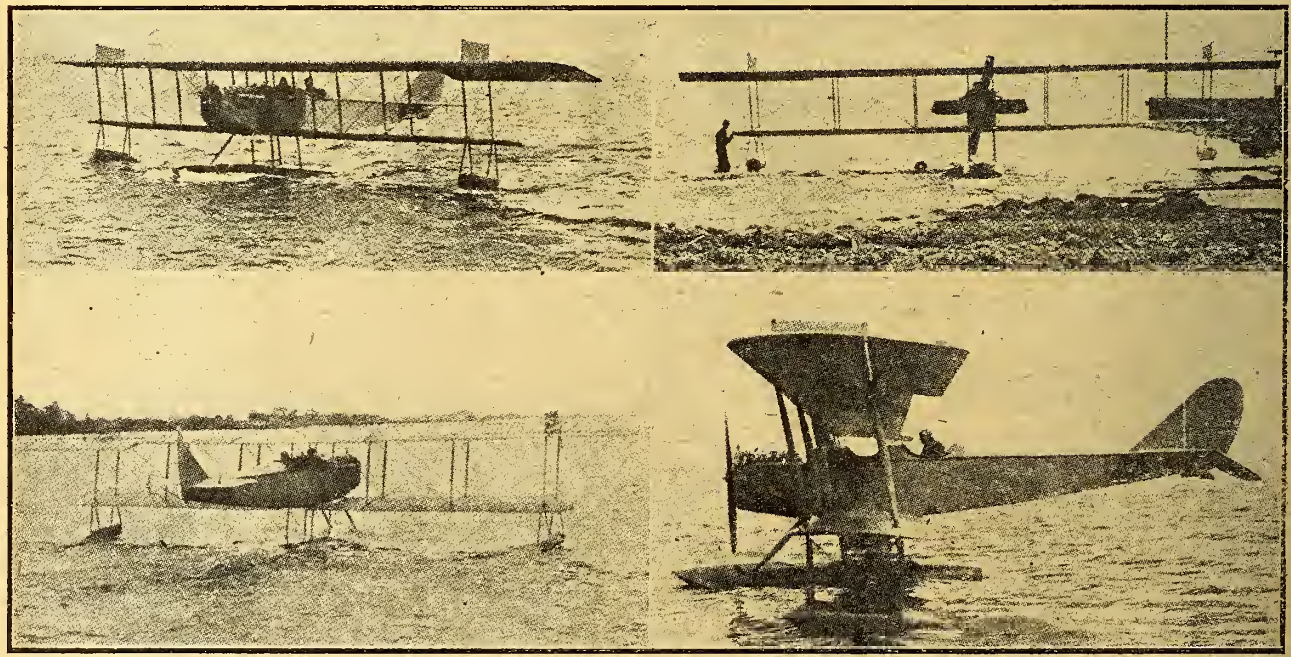
Part IX.—Data.

Two pages are devoted to each of the 87 operations involved in the dismantling, cleaning, and re-assembling of the engine, each operation being illustrated by an excellent photograph of the work actually being done, which makes the accompanying instructions clear to the most untutored mind or the meanest intelligence.

The main reason for the publication of this book being the purpose of propaganda, the Gnôme and Le Rhône Engine Co. do not wish to make a profit from its sale. The price, therefore, has been fixed at half-a-crown, which, as a matter of fact, is considerably less than the cost of production.

An equally important volume, a catalogue of prices and numbers of monosoupape Gnôme spare parts, has also been published. This production is also well illustrated and carefully indexed. As it is intended solely for the use of the trade, the price is more exclusive, namely, 12s. 6d.

Either volume may be obtained upon application to the Gnôme and Le Rhône Engine Co., 47, Victoria Street, London, S.W.1.—
W. L. W.



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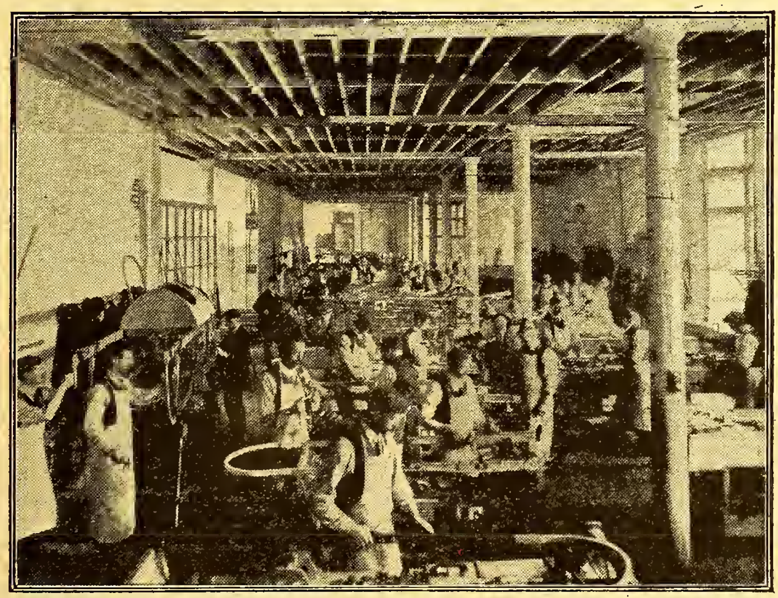

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Aero-motors: In Kind and Construction.—(*Continued*)

BY GEOFFREY de HOLDEN-STONE.

"Was He Uplift?"

Evasions would be excusable if they were ever ingenious; but a Scotch answer exciteth wrath. It appears to serve, but really gets nowhere. So, with all respect to Mr. Dugald Clerk's scientific profundity, and his professorial and professional attainments, I have never been able to regard his auxiliary-cylindrical contribution to two-stroke design as anything but a typically Caledonian evasion of the actual issues. It runs, certainly—when did a Scots engineer ever fail to deliver a working result?—and so do its French imitation, the Bichrone, and its British congener, the Lamplough; but where does the scheme of any of them display one of the characteristic advantages of the two-stroker conception?

Let me then repeat the list of these, as an ideal—a very practical one, too—to keep in mind. Power, assured and constant, first and last. This within the smallest compass, and obtained, if possible, upon half the mass-weight without any lessening of structural strength. Also delivered with the most even torque, vibrationless balance and absence of couple; and with no increase—for the given power—of petrol, lubricant, or cooling water. Withal—the key to most of the rest—the *utmost mechanical simplicity*.

Clerk-Cycle Defects.

Thus the Clerk type of two-stroker gives its power. That is to say, about the usual two-fifths more, at best, than a four-stroker of the same working-cylinder capacity. And no more. But with actually twice the bulk, and with all the extra weight of a second set of cylinders, which might just as well be workers, but so far from doing any positive, power-developing work, positively absorb power in overcoming the inertia of their working parts, crank-shaft, connecting-rods, and pistons. So that the actual extra power available from the working cylinders is lessened by another fifth at least. Again, vibration and want of due balance must be set up, because no mere pumping piston can balance an opposite working one throughout the phases of the cycle. It will, for instance, obviously dwell during the latter's final compression-stroke and rush during the working one. Which cannot do its bearings any good.

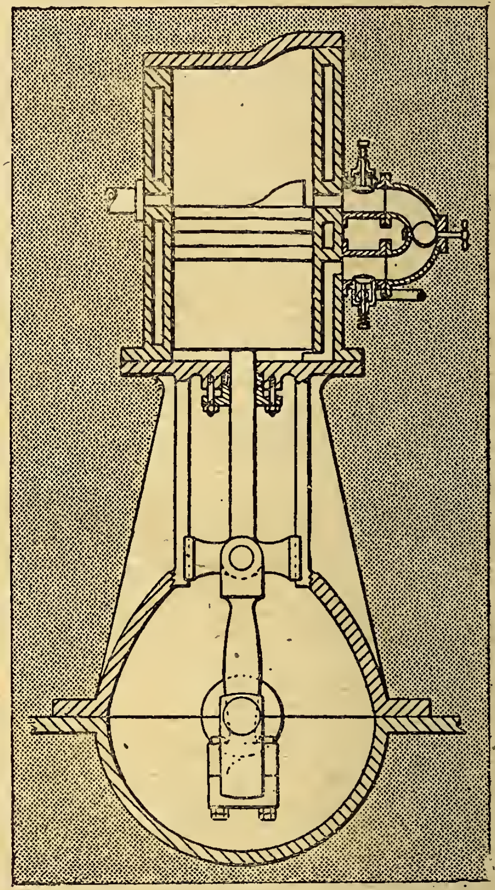
Lastly, regard the mechanical complication, and the consequent cost of production. All of which factors—inherent to the design of the Clerk type of two-stroker—seem to disqualify it even as a commercial proposition, let alone for the special requirements of aviation.

The Day Ported Type.

Next we come to the two and three-port type of two-stroker, invented in 1891 by Mr. Joseph Day, of Bath. This type is one of the simplest motor-mechanisms ever designed, and therefore one of the most commercial motor-propositions. In fact, there are only three two-stroke possibilities of design—so far as I can see—which are simpler; and one of these is a revolver model, a war-arrested experiment. But for the long-successful Day-type what else can be said, since it consists essentially of only five parts—cylinder, slide-valve piston, gudgeon-pin, crank-shaft, and crank-chamber; since, too, it is valveless, except for perhaps one automatic in its simple carburettor?

Nothing yet designed is more compact, for not only does it permit of monobloc casting, but the cylinders can be shortened to little more than the actual length of the piston travel plus the compression space; a four-stroke characteristic which is exceedingly difficult to embody in two-stroke practice; and so far as I can remember, has only been achieved in one other case.

Thus one can see how it was that practically every marine motor manufacturer in the United States, big and little, pirated the design, until the utterly unexpected Day of reckoning arrived, on reckoning bent. Yet—especially since the patents must have long since run out—the Day-type has become a habit rather than anything else in the States. Commercially speaking, they use no other; a typical example out of some score or so being the Roberts four- and six-cylinder model.



The Robson two-stroke, with piston-rod and connecting rod.

And Its Limitations.

Nevertheless, the defects of the Day-type, from the standpoint of general working efficiency, are numerous, if not all of them obvious at first sight. They are, at any rate, fatal, in the light of later developments for special conditions. Mechanically, the characteristic crank-chamber compression system is bad, because it calls for bearings of otherwise unnecessary length; also with extra packing; and further demands that the bearings shall remain in perfect condition to keep the crank-chamber compression-tight.

Now there is only one way—at least for commercial production—to overcome this defect. Which is, either to form or screw

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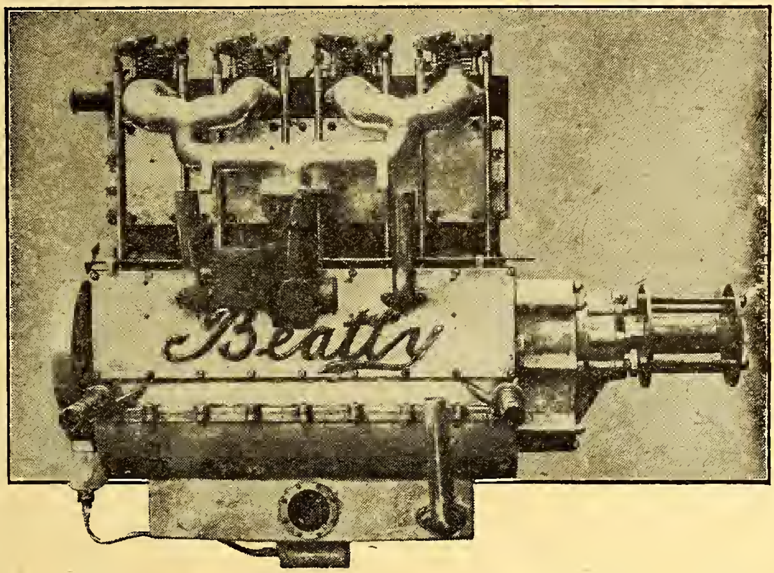

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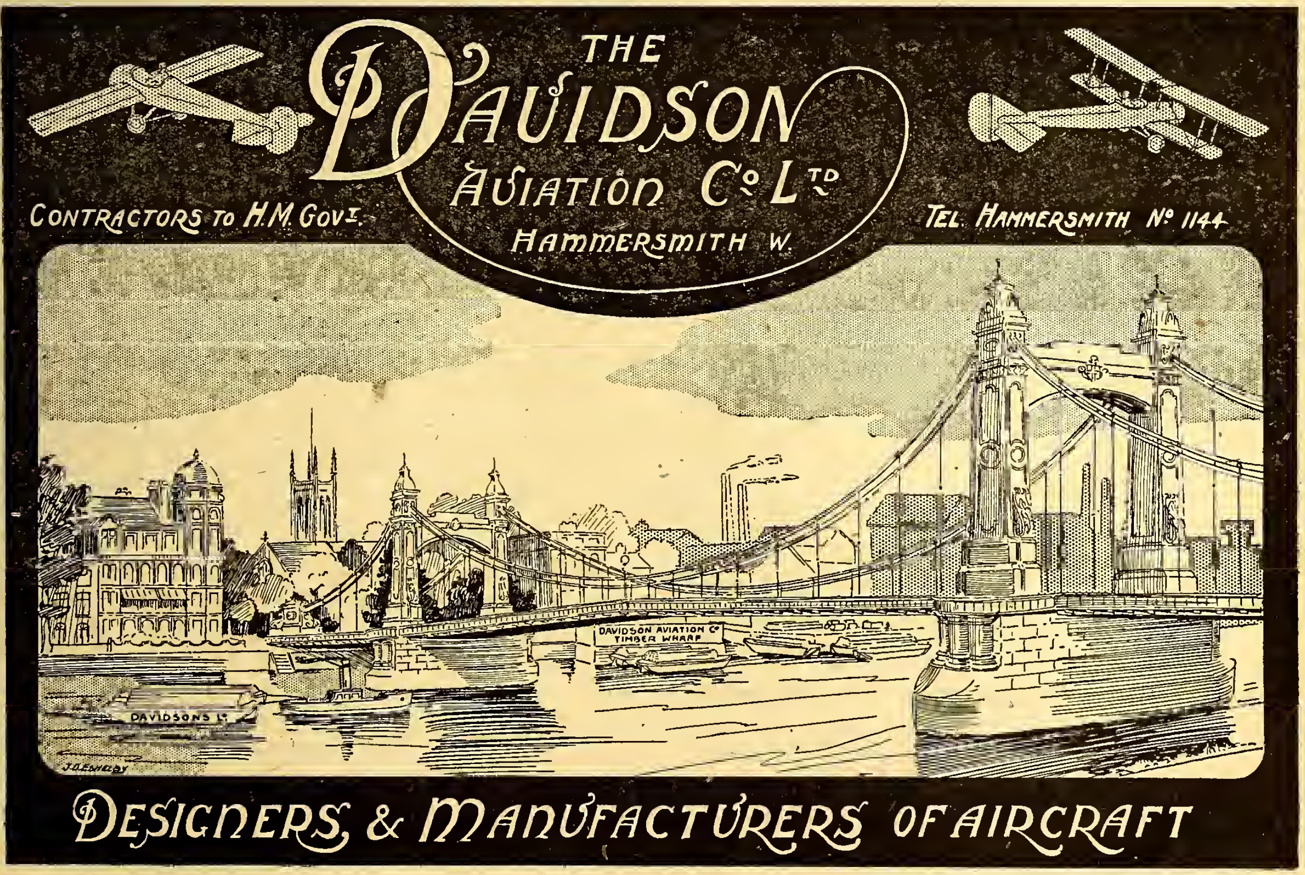
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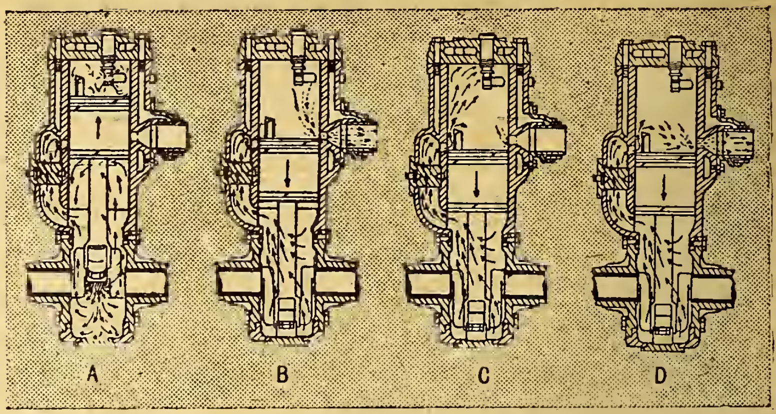

THE OPERATION OF A TYPICAL TWO-STROKER.

(A)—Beginning of the Firing Stroke. (B)—Exhaust beginning. (C)—Inrush of new gas to cylinder-head, in theory, spoiled by (D), where for a fraction of a second the incoming gas escapes across to the exhaust-port, thus accounting for the two-stroker failing to double the power of the four stroker.

on a thin circular plate upon the end-journals of the shaft—or else from the end webs circular—and rest the plate against a graphite pad or disc in a close-fitting recess in the *inner* side of the crank-chamber end-plates, that usually contain the bearing in two-strokers of this type. This, as I say, might be done successfully. But as it does not happen to have been done as yet, one cannot regard the type, as such, apart from the defect in question.

As a result, then, further defects arise. The mixture, especially at varying speeds, suffers from contact with the lubricant. The ponding of a bad carburettor, or one with too coarse a jet, at once thins down the lubricant, unless the latter is of animal or vegetable origin; that is to say, wholly unsuitable for economical or even reliable use in any motor, other than a rotary, *faute de mieux.*

PHYSICAL DISADVANTAGES.

Moreover, the conditions—those of leakage through the end bearings as they wear—do not permit of a primary compression greater than one atmosphere; in practice, usually reduced to 0.75 or thereabouts.

Now, considering the relation of the inlet-port to the exhaust-port in the Day type—that is to say, the former well *below* the latter—a moment's thought will establish the certainty that the new charge, despite its greater *weight,* will not and cannot force its way in against the pressure of the last exploded charge—or what remains of it—sufficiently to fill the cylinder; or even to rise above the half-burned and still usable gases, to stratify above them in the manner of the Lahaussois "Rex" four-stroke or the original Daimler.

This naturally makes anything like high speeds—that is, above 900 to 1,000 r.p.m., at a maximum—out of the question.

Going higher still, the physical-efficiency aspect is still worse. The exhaust port—or ring of port-holes—must in any case be well above the end of the piston-head's travel to clear any of the burnt gases. So far, all is as it should be. That is the invariably correct position for the exhaust porting: and—let me emphasise the fact—the real starting point of the design of any two-stroke motor, to which everything else must be duly related.

But in this case what happens? The inlet porting on the opposite side is well below the level of the exhaust, practically just above the end of the piston-head's travel. This relation once varied, the motor ceases to be a Day type. Therefore in these circumstances it becomes obvious that any so-called deflector or crest on the piston-head, however close to the inlet side, is useless to prevent a goodly portion of the new charge being swept into the exhaust and wasted. Also, that the higher the compression, and the more advanced the ignition, the more will this radical defect be increased.

One sees, then, that the valveless ideal of two-stroke design is not wholly and solely attained by the mere prosecution of mechanical simplicity. That goes a long way, certainly, but originality of conception—and of something far better than the Day type—must lead and govern the proposition.

THE SMALLEY IMPROVEMENT.

All this must have been clearly recognised by Smalley of Michigan. His clever remedy, therefore, for this defect of wastage was to cast his transfer passage higher, so as to lead upwards to an inlet valve on the top of the combustion chamber, from an outlet port placed much higher in the cylinder walls than in the Day type, which port coincided at the end of the piston outstroke with a port cut in the trunk of the piston just below the head.

This worked like a charm: for the a.o. inlet valve was not only pressure-balanced at all speeds, and so only needed a light spring which wore well—but obviously prevented back-firing on the one hand, and premature entry of the new charge before the explosion pressures had duly fallen to the correct degree.

All these matters regulated themselves automatically; the sole physical defect remaining was that the inertias of the respective gases—the new charge and the burned one—could not be overcome sufficiently for high speed, even by advancing the ignition beyond the point at which the risk arises of reversing the motor! And even so, Smalley had still to reckon in vain with the fundamental defect of crank-chamber compression. Also, his motor could not be called valveless, still less be made so.

Still, a duly refined Smalley design—especially one with pressure baffles on its crank-shaft ends, as recommended—would make a far better aero-motor proposition than any possible exemplar of the Day cycle. Indeed, modern aero-motor practice in detail should be able to develop an eight-cylinder V type embodying the Smalley principle, nearly twice as powerful and quite as reliable as any four-stroker of the same cylinder capacity.

Another enthusiast of two-stroke design—Mr. A. F. Evans, for many years well known in the marine-motor branch of the Napier Company—proposed to modify the defect of crank-chamber compression, by compressing air only in the crank-chamber and causing it to siphon up petrol from a flask-and-jet arrangement at one side into a transfer passage and thence—by way of an a.o. valve—into the combustion space, after the fashion of Smalley's earlier proposition. It is needless to say—in view of the success of the Antoinette motors direct delivery petrol-feed—that this Evans system worked; and like the Smalley, would to-day be capable of great things under modern detail treatment. But it had two fatal defects. It was not only before its time, but wholly contrary to the unwritten act for the defence of the four-stroke realm!

(*To be continued.*)

A GOOD SCHOOL BIPLANE.

Apropos the recent mention in this paper of the L. and P. school machine, built by the London and Provincial Aviation Co., of Hendon to the designs of Mr. Tony Fletcher, information has come to hand that this machine may very well claim to hold the looping record so far as passengers are concerned.

Some few weeks ago Mr. Geoffrey Smiles, as pilot, with Mr. Fletcher as passenger, made 29 consecutive loops with a descent from 4,500 ft. One has heard of a certain distinguished R.F.C. officer who claims to have made 70 consecutive loops, but, although one would not doubt his accuracy of statement, one can only assume that his machine must have been fitted with a revolution recorder to keep count of such a number.

Incidentally the L. and P. have now done over a thousand loops without disclosing any structural defects and without needing any serious repairs. This particular machine, fitted with a 60-65 h.p. "Anzani" engine, which only uses some six gallons of petrol per hour, puts up a speed of 72 m.p.h., and will take pilot and passenger with full tanks to 3,500 ft. in between eight and nine minutes. She has been proved to be "spin-proof," and as near as no matter "fool-proof," and can be produced at a really moderate price, so that it seems to have much to recommend it for school work.

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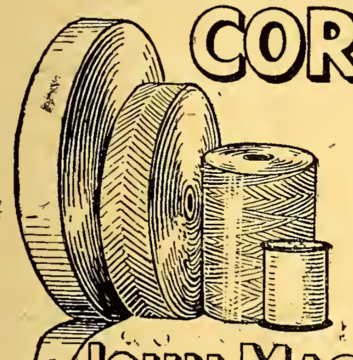

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MARKET REPORTS.

Prices given are for quantities on usual terms.

For the various aircraft materials affected by the materials referred to below, the reader is referred to The Aeroplane of March 7th.

COPPER.—There has been a slight reduction in the price of Standard Copper, but Electrolytic, Sheets, and Tube remain the same, and the general tendency is for the present prices to remain unchanged.

The political situation is still uncertain in U.S.A., and business is restrained in consequence.

Standard Copper.—Cash terms: Price to-day, £136; a week ago, 139. Current prices: Copper Sheets, £174; Copper Tube, 20¾d.; Brass Tube, 17½d.; Brass Sheet, 16⅜d.

STEEL. — It is now extremely difficult to place orders for Steel to any R.A.F. specifications. 90 per cent. of the rolling mills refuse to quote, and the firms quoting will not promise decent delivery. Prices do not show much alteration, but there are rumours of further restrictions and a more stringent control of the firms making R.A.F. steels. There appears to be a general eagerness on the part of buyers to increase their stocks, but, as stated above, it is difficult to place orders.

It is to be hoped that the contemplated restrictions and steadily increasing output of the Sheffield mills will mean more steel for Government aircraft contracts.

Current average prices: R.A.F. 3A Steel, under ½ in., 48s. to 52s.; R.A F. 1E Steel, under ½ in., 82s. to 88s.; R.A.F. 9A Steel Sheet, 28s. to 29s. 6d.; plus tests ditto.

ALUMINIUM.—The Director of Materials A.M.2 (H) has now issued the regulations governing the scrap aluminium, and for the benefit of any aircraft firms who sell their scrap, as per clause "B" in last week's report, the prices fixed by the Director of Materials are given below:—

Grade.	*Per cent. of Aluminium.*	*Scrap or Swarf.*	*Descriptive.*	*Price per ton on sale to refiner D/D at Refinery*	*Price per ton on resale by refiner D/D at purchasers works if within a radius of 50 miles, otherwise an amount to cover extra freightage can be charged*
1 (a).	96 minimum.	Scrap.	Sheet cuttings and rods containing a minimum of 96 per cent. A1.	£160	£175
(b).	96 minimum.	Scrap.	Old rolled, etc., cutting a min. of 95 per cent. A1 ...	£120	£134
(c).	96 minimum.	Swarf.	Spinnings, punchings & thin, small scrap that needs melting (also painted and varnished scrap). cutting a min. of 96 per cent. A1.	£105	£138
2 (a).	87 to 95 both inclusive.	Scrap.	Lump scrap from aero castings, and material of equivalent value, cutting 87 to 95 per cent. A1 ...	£100	£113
(b).	87 to 95 both inclusive.	Swarf.	Turnings and swarf generally, cutting 87 to 95 per cent. A1	£87 10	£117 10
3 (a).	80 to 86 both inclusive.	Scrap.	Scrap generally, cutting 80 to 86 per cent. A1 ...	£80	£91
(b).	80 to 86 both inclusive.	Swarf.	Swarf and inferior swarf generally cutting 80 to 86 per cent. A1	£70	£97
4 (a).	Below 80. ...	Scrap.	All scrap cutting below 80 per cent. A1	Not to exceed £65.	Not to exceed £75.
(b).	Below 80. ...	Swarf.	All swarf cutting below 80 per cent. A1	Not to exceed £60.	Not to exceed £85.

The foregoing prices are based on grades consisting of dry and clean swarf, and of scrap containing not more than 8 per cent. of moisture and/or dirt.

In the case of scrap, if over 8 per cent. of moisture and/or dirt be present, the material may be classified as wet and/or dirty, and a cent. per cent. deduction made from the prices on sale to the refiner for all moisture and/or dirt present above 8 per cent. The price for scrap on sale to the refiner may be further reduced by an amount not exceeding £5 per ton for any scrap containing 20 per cent. or more of dirt.

In the case of swarf, a cent. per cent. deduction may be made from the prices on sale to the refiner for any moisture and/or dirt present. In addition to the total percentage therefore dededucted, a further sum may be deducted equal to the cost of melting any amount of dry and clean swarf equal to the amount of moisture and/or dirt present, such cost of melting being taken for this purpose to be £12 10s. per ton.

Oil is included in the term moisture. By dirt is to be understood any foreign solid matter, including oxide of aluminium, free iron and other metals, and ordinary shop sweepings.

The refiner shall ascertain if the scrap and swarf contains more than 0.7 per cent. of alloyed iron. If it does, the price on sale to the refiner shall be reduced 1 per cent. for every 0.1 per cent. of alloyed iron in excess of 0.7 per cent.

In the event of a difference arising between the seller and refiner as to the grade of the material, the price to be paid by the refiner, or as regards any other question under the above provisions, the decision of the Director of Materials shall be final.

Applications for permits should be made to the Director of Material A.M.2 (H), Hotel Victoria, Northumberland Avenue, London, S.W., and marked "Aluminium permit."

Note.—For the purpose of the above regulations, the following refiners have been nominated by the Ministry of Munitions:—

Birmingham Area:—Mr. W. Atkins, Bradford Street, Birmingham; Clemmons Aluminium Co., Ashton Street, Birmingham; The Midland Aluminium Co., Great Francis Street, Birmingham; Mr. T. J. Priestman, Leopold Street, Birmingham.

Coventry Area:—Coventry Metal and Iron Co., Ltd., Coventry; Sterlings Metals, Ltd., Foleshill, Coventry.

London Area:—Raphael's Refinery, Thomas Street, Burdett Road, E.

Newcastle-on-Tyne Area:—Sir W. G. Armstrong Whitworth and Co., Ltd., Elswick Works, Newcastle-on-Tyne.

Reading and South of England Area:—The Metal Smelters, Ltd., Boarded Lane, Castle Street, Reading.

The name of the refiners nominated for other districts will be announced later.

TIMBER.—The Government have prohibited importation of every description of timber. A special licence must be obtained for shipments of timber required for urgent Government contracts.

The market remains unchanged, and it is extremely difficult to buy dry wood. There is a good stock of Mahogany, but this is held by a few firms only, with the usual results.

Comparison of Average Prices.

To-Day.	A Year Ago.
Silver Spruce, 13s. to 14s. c.f.	7s. 9d. to 8s. 3d. c.f.
English Ash, 12s. to 13s. c.f.	10s. to 11s c.f.
Walnut, 2s. 3d. super.	1s. 6d. super.
Mahogany (Plank), 1s. 10½d., to 2s. super.	Plank, 1s. 2d. to 1s. 3d. super.

Prices are for Selection and Delivery.

FABRIC.—Manufacturers are still anxiously waiting for the official price of 17 C Cloth and Spaced Fabric. As stated in my first report, it was rumoured that the price would be 29d. per yard 36 ins. wide. It is now thought that this will be exceeded.

March 17th, 1917.

New Patents.

This list is specially compiled for The Aeroplane by Rayner and Co., Registered Patent Agents, 5, Chancery Lane, E.C.

Latest Patent Applications.

3335. A. L. Anderson. Locking-device for bracing wires or cables of aircraft, etc. 7/3/17.

3330. C. A. Christianson. Aeroplanes, etc.

3321. C. Dreyfus. Manufacturer of dopes for aircraft fabrics, waterproof varnishes, coating preparations, film compositions, celluloid substitutes, etc., or other articles thereof. 6/3/17.

3407. H. Middleton. Steering screw propellers for ships, airships, etc. 8/3/17.

Specifications Accepted This Week.

104,346. C. A. Johansson. Stabilisation of aircraft.

104,386. Marconi's Wireless Telegraph Co., and H. M. Dowsett. Aeroplanes fitted with wireless telegraph apparatus.

Latest Published Abstract.

15,504. Aeroplanes and airships. C. A. Wragg, 355, Post Office Place, Melbourne, Australia.

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Printed copies of the published specifications and abstract can be obtained from Messrs. Rayner and Co., at the price of 1s. each.

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(*Continued from page 724.*)

1916. Lt. H. W. Young, Lond. R., T.F., Jan. 1st. Temp. Lt. R. W. Patterson, R.E., Jan. 16th.

Royal Regiment of Artillery.—R.G.A.—To be actg. Lt.-Cols. whilst commanding an Anti-Aircraft Group:—Capt. R. R. Curling, Nov. 16th, 1916. Maj. H. B. L. G. Gunn, M.C., Dec. 20th, 1916.

Infantry.—Linc. R.—Sgt.-Maj. A. Wombwell, from Staff, to be Sec. Lt., and to be secd. for duty with R.F.C., March 16th.

Memoranda.—L.-Cpl. W. G. M. Nicholl, from A.S.C., to be temp. Sec. Lt. for duty with R.F.C., Oct. 27th, 1915 (substituted for notification in "Gazette" of Nov. 22nd, 1915).

A. H. Sippe to be temp. Sec. Lt. (on prob.) for duty with R.F.C., March 9th.

* * *

From the "London Gazette," Friday, March 16th, 1917.

Admiralty, March 9th.

R.N.A.S.—With reference to the notice in "Gazette" of Feb. 18th, 1916, granting a temp. commn. as Flt. Sub.-Lt. in the R.N.A.S. to W. H. Wood, the date of seny. should be Sept., 1915, and not as therein stated.

War Office, March 16th.

REGULAR FORCES.—Establishments.—R.F.C.—Military Wing.—Flight Commanders.—Lt. R. H. Cronyn, Spec. Res., from a Flying Officer, and to be temp. Capt. whilst so employed, March 4th.

Flying Officers.—Temp. Sec. Lt. D. Lindley, S. Wales Bord., and to be transfd. to Gen. List, Feb. 26th. Maj. J. A. Milot, Canadian, Gen. List; Lt. S. McKercher, Canadian Inf. Bn., Feb. 27th. Temp. Sec. Lt. D. R. C. Lloyd, N. Lan. R., and to be transfd. to Gen. List; temp. Sec. Lt. E. Kent Essex R.; Sec. Lt. (on prob.) G. E. P. Elder, Spec. Res., Feb. 28th.

Balloon Officers.—Sec. Lt. A. R. Barker, Unattd. List, Ind. Army, Jan. 31st. Sec. Lt. (temp. Lt.) C. B. Waters, Lond. R., T.F., and to be secd.; temp. Sec. Lt. S. N. Veitch, Gen. List, from an Equipment Officer, 3rd. Cl.; Sec. Lt. D. W. Lamb, Lond. R., T.F., and to be secd.; Sec. Lt. (on prob.) J. G. Sharp, R.G.A., Spec. Res.; temp. Sec. Lt. (on prob.) A. L. Baker, Gen. List, Feb. 21st. Temp. Sec. Lt. W. M. Edwards, Gen. List, Feb. 23rd.

Equipment Officers, 1st Cl.—Sec. Lt. (temp. Lt.) H. A. Browne, Spec. Res., from the 2nd Cl., and to be temp. Capt. whilst so employed, Feb. 22nd. 2nd Cl.—Lt. (temp. Capt.) A. M. Cott, Spec. Res., reverts from Equipment Officer, 1st Cl., and relinquishes his temp. rank, Dec. 26th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Military Wing.—Sec. Lt. N. Greenwell relinquishes his commn. on acct. of ill-health, and is granted hon. rank of Sec. Lt., March 17th. The date of appt. as Sec. Lt. (on prob.) of H. B. Lilley is Dec. 13th, 1916, and not as in "Gazette" of Jan. 12th.

* * *

From The "London Gazette" Supplement, March 17th, 1917.

War Office, March 17th.

REGULAR FORCES—Establishments.—R.F.C.—Mil. Wing.—Flying Officers.—Lt. W. H. Williams, Lan. Fus., T.F., and to be secd.; temp. Sec. Lt. L. E. Francis, R. W. Surr. R., Feb. 5th. Sec. Lt. A. C. Dunlap, R.E., T.F., and to be secd.; temp. Sec. Lt. W. J. Clifford, Gen. List, from a Flying Officer (Observer), seny. May 30th, 1916. Temp. Sec. Lt. B. B. Lemon, Gen. List; temp. Sec. Lt. M. Topham, Gen. List; Sec. Lt. S. F. Brown, Spec. Res.; temp. Sec. Lt. N. P. Henderson, Gen. List, Feb. 15th. Temp. Lt. W. A. de L. Y. Bainbrigge, Bord. R., and to be transfd. to Gen. List; Lt. E. F. Ambler, Lond. R., T.F., and to be secd.; temp. Sec. Lt. J. E. Doyle, A.S.C., and to be transfd. to Gen. List, Feb. 22nd. Temp. Sec. Lt. (temp. Lt.) J. B. Tait, Gen. List, from a Flying Officer (Observer), seny. May 31st, 1916. Sec. Lt. (temp. Lt.) W. Harle, North'd Fus., T.F., from a Divl. Sig. Co., R.E., T.F., and to be secd.; temp. Sec. Lt. (on prob.) R. H. Latham, Gen. List, Feb. 23rd. Lt. F. C. B. Savile, D. of Corn. L.I., and to be secd.; Sec. Lt. F. J. Marsden, Yeo., T.F., and to be secd.; temp. Sec. Lt. E. P. Hughes, Gen. List, Feb. 25th. Lt. C. Patteson, M.C., S. Wales Bord., and to be secd.; temp. Sec. Lt. R. M. K. Denning, S. Staff R., and to be transfd. to Gen. List; temp. Sec. Lt. J. D. Atkinson, R.E.; temp. Sec. Lt. (on prob.) C. A. Farquharson, Gen. List; temp. Sec. Lt. (on prob.) L. A. Weston, Gen. List, Feb. 26th. Sec. Lt. (temp. Lt.) F. W. Winterbotham, Yeo., T.F., and to be secd.; temp. Sec. Lt. C. Street, Gen. List, from a Flying Officer (Observer), with seny. Sept. 11th, 1916. Temp. Sec. Lt. R. G. R Townsend, Gen. List; temp. Sec. Lt. (on prob.) N. MacMillan, Gen. List, Feb. 22nd. Temp. Lt. R. W. Dobbie, attd. High. L.I., and to be transfd. to Gen. List; Sec. Lt. (temp. Lt.) J. C. Woollett, R.F.A., T.F., and to be secd.; Sec. Lt. G. L. Lloyd, Yeo., T.F., and to be secd.; Sec. Lt. W. H. Crundall, R.E., T.F., from attd. R.E., T.F., and to be secd.; temp. Sec. Lt. A. S. Thompson, attd. R. War. R., and to be transfd. to Gen. List; temp. Sec. Lt. H. Smither, Gen. List; temp. Sec. Lt. (on prob.) W. P. T. Watts, Gen. List, Feb. 28th.

Equipment Officers, 3rd Cl.—Temp. Capt. (temp. Maj.) C. K. Butler-Stoney, R.F.C., T.F., Feb. 21st. Temp. Sec. Lt. (on prob.) C. Atkey, Gen. List, Feb. 25th. Temp. Sec. Lt. (on prob.) C. J. Miln, Gen. List, Feb. 28th.

Memoranda.—Sergt.-Maj. J. R. Nicholls, from R.F.C., to be Sec. Lt. for duty with R.F.C., March 18th.

Temp. Sec. Lt. (on prob.) R. Ritchie is confirmed in his rank.

S. M. Pemberton, late temp. Sec. Lt., to be temp. Sec. Lt. (on prob.) for duty with R.F.C., Dec. 28th, 1916 (substituted for the notification in the "Gazette" of Feb. 24th).

Qr.-Mr. and Hon. Capt. J. Rafferty, h.p., retires on ret. pay, March 18th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Mil. Wing.—Sec. Lt. (on prob.) H. Townend is dismissed the Service by sentence of a General Court-martial, Feb. 2nd.

R. S. Wakeford to be Sec. Lt. (on prob.), Sept. 23rd, 1916.

* * *

The King has been pleased to approve of the following Honours and Rewards for distinguished service in the Field, in Mesopotamia, with effect from March 10th, 1917, inclusive:—

To be Brevet Major.

Capt. (temp. Lt.-Col.) J. E. Tennant, M.C., S. Gds and R.F.C.

Distinguished Service Order.

Capt. (temp. Maj.) Hereward de Havilland, R.F.C., Spec. Res.

Military Cross.

Lt. James Rattray Burns, Sco. Rif. and R.F.C.

* * *

From the "London Gazette" Supplement, March 19th, 1917.

War Office, March 19th

REGULAR FORCES—Establishments.—R.F.C.—Mil. Wing.—Flying Officers.—Temp. Sec. Lt. G. H. Palmer, Gen. List, Feb. 12th. Temp. Sec. Lt. N. E. Barraclough, Gen. List, Feb. 18th. Sec. Lt. (temp. Lt.) C. F. Bailey, Lond. R., T.F., and to be secd.; Sec. Lt. (temp. Lt.) D. C. Knott, Hamps. R., T.F., and to be secd., Feb. 24th. Sec. Lt. W. H. Ryder, Yeo., T.F., and to be secd.; temp. Sec. Lt. J. Robertson, Durh. L.I., and to be transfd. to Gen. List; Sec. Lt. J. C. C. Piggott, D. of Corn. L.I., and to be secd.; Sec. Lt. G. B. McMichael, Hereford. R., T.F., and to be secd.; Sec. Lt. P. Sellars, Worc. R., and to be secd.; Temp. Sec. Lt. (on prob.) J. G. H. Frew, Gen. List; Sec. Lt. (on prob.) A. d'A. Sutherland, Spec. Res.; Sec. Lt. A. G. Davidson, Gord. Highrs., T.F., and to be secd.; Sec. Lt. G. B. C. Way, S. Lanc. R., and to be secd., Feb. 26th. Lt. G. F. Bradley, R. War. R., Spec. Res., and to be secd.; Sec. Lt. (temp. Lt.) M. Campbell, R. W. Kent R., T.F., and to be secd.; temp. Sec. Lt. C. R. Alston, S. Lanc. R., and to be transfd. to Gen. List; Sec. Lt. J. Cairns, R.E., T.F., and to be secd.; temp. Sec. Lt. D. Gordon, Gen. List; Sec. Lt. (temp. Capt.) W. H. Costello, R.G.A., T.F., and to be secd.; temp. Lt. S. F. P. Polhill, Gen. List, from a Flying Officer (Observer), with seny. from Aug. 16th, 1916. Sec. Lt. W. M. Staniforth, Yeo., T.F., and to be secd.; temp. Sec. Lt. (on prob.) J. A. Craig, attd. R. Fus., and to be transfd. to Gen. List; temp. Sec. Lt. (on prob.) H. R. Parry, attd. Ches. R., and to be transfd. to Gen. List; Sec. Lt. P. S. Leigh, Spec. Res., Feb. 27th.

Equipment Officers, 1st Cl.—Lt. (temp. Capt.) J. R. M. Stanfield, R.E., T.F., from a Staff Capt., to retain his temp. rank whilst so employed, and to be secd., March 1st. 3rd Cl.—Sec. Lt. J. E. J. Crawford, Spec. Res., Jan. 30th. Sec. Lt. J. W. Parkinson, Spec. Res., Feb. 10th. Sec. Lt. F. Ryder, Spec. Res., Feb. 11th. The appt. of temp. Lt. H. J. Gilbert, A.O.D., notified in the "Gazette" of Feb. 27th, is antedated to Jan. 1st.

Royal Regiment of Artillery.—R.H. and R.F.A.—Maj. T. C. Newton to be actg. Lt.-Col. while comdg. an Anti-Aircraft Group, Dec. 4th, 1916.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Mil. Wing.—Sec. Lt. (on prob.) J. Doxey-Parkinson is removed from the Army, the King having no further occasion for his services as an Officer, March 20th.

TERRITORIAL FORCE.—Infantry.—R. W. Kent R.—Sec. Lt. (temp. Lt.) D. Y. Hay is secd. for duty with R.F.C., Feb. 28th.

FROM THE COURT CIRCULAR.

Buckingham Palace, March 14th.

The following officer had the honour of being received by the King this morning, when His Majesty invested him with the Insignia of Companion of the Order into which he has been admitted:—

Distingushed Service Order.

Lieut.-Col. Henry Brock, R.F.C.

The King then conferred the following decorations:—

The Military Cross.

Major Adolph Walser, Lond. Regt. and R.F.C.

Capt. Leslie Aizlewood, York and Lancaster Regt. and R.F.C.

Lieut. Edward Burney, R.F.C.

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BUCKINGHAM PALACE, March 17th.

The following officers had the honour of being received by the King, when His Majesty conferred decorations as follows:—

BAR TO THE MILITARY CROSS.

Capt. Awdry Vaucour, Royal Artillery and R.F.C.

THE MILITARY CROSS.

Capt. Ernest Foot, R.F.C.
Capt. James Latta, R.F.C.

NAVAL.

The following appointments have been made in the R.N.A.S.:

MARCH 14th.—The following have been entered as Proby. Flt. Officers (temp.), seny. March 18th, and all apptd. to "President," addl., for R.N.A.S.—A. S. Girling, M. W. Baseden, C. H. Whitehouse, M. H. Bailey, L. E. Swann, L. L. King, C. W. Capes, N. T. Thornloe, F. H. R. Slowburn, J. W. C. Reynell, L. C. Hill, W. F. Cleeve, G. Davies, W. Igleson, E.M. Knott, W. R. D. Pandon, J. C. F. Simpson, E. A. Mossop, G. Slater.

Mr. H. J. Emery entered as Proby. Flt. Officer (temp.), seny. March 8th, and apptd. to "President," addl., for R.N.A.S.

Temp. Commissions (R.N.V.R.) have been granted to the following, seny. as stated.—Lieuts.—J. R. Erskine-Murray, D.S.C., March 10th. S. J. Smith, P. Westacott, W. M. Jones, and Prof. P. G. Gundry, all apptd. to "President," addl., for R.N.A.S., March 12th. Sub.-Lt.—C. G. Lindlay, March 10th, and apptd. to "President," addl., for R.N.A.S.

Mr. E. Selley promoted to Wing Officer (2nd grade), temp., seny. March 10th, and apptd. to "President," addl. for R.N.A.S.

MARCH 19th.—Lt.—H. S. Holroyd, entered as Proby. Flt. Officer (temp.), seny. March 25th.

Proby. Flt. Officer (temp.)—A. E. Horn, granted a temp. commission as Sub-Lt. (R.N.V.R.), seny. March 17th.

The following late Proby. Flt. Officers (temp.) have been granted temp. commissions as Sub-Lt. (R.N.V.R.), seny. March 17th:—J. R. Attwell, D. I. Davies, E. W. Unmack, R. W. Greenwood and W. L. H. Pattison.

Temp. commissions (R.N.V.R.) have been granted to the following, seny. March 17th:—Lts.—G. W. Wildman, A. McD. Steele, B. V. Roche. Sub-Lts.—S. T. Butteris, F. B. Pelly.

ADMIRALTY COMMUNIQUÉ.

MARCH 17th.—Field-Marshal Sir Douglas Haig, Commander-in-Chief, British Armies in France, has expressed his appreciation of the fine work and good services rendered by the squadron of the Royal Naval Air Service (No. 8) attached to his Armies.

He states that this squadron has done much fighting, and that pilots have shown great enterprise and dash, and have always acquitted themselves admirably.

Numerous offensive patrols have been carried out by the squadron over the enemy's lines, and it has to its credit 14 hostile aircraft certainly destroyed, and 13 driven down, the larger part of which must have been wrecked.

THE CASUALTY LIST.

Reported March 14th.

ACCIDENTLY KILLED.—Knight, Flt. Sub.-Lt. Ronald V., R.N.
DROWNED.—Boyland, C. D., Air Mech., 1st grade, F.4331.
Goode, A. E., Air Mech., 2nd grade, J.29316.

Reported March 17th.

ACCIDENTALLY DROWNED.—Birks, Flt. Sub-Lt. Rowland, R.N.

PERSONAL NOTICES.

DEATHS.

BIRKS.—Flt. Sub-Lieut. R. Birks, R.N., killed whilst flying, was the son of Mr. J. Birks, of Brudenell Road, Leeds. He was formerly an officer of the British India Steam Navigation Co., and left India to take his commission.

* * *

WALKER.—Flt. Sub-Lieut. Frederic Cloete (Deric) Walker, R.N., killed in action on March 17th, 1917, was the only son of Mr. and Mrs. F. J. Walker, 27, Upper Hamilton Terrace. He was aged 18, and had seniority of June 18th, 1916.

MILITARY.

G.H.Q. COMMUNIQUÉS.

MARCH 16th, 9.20 p.m.—A number of reconnaissances were carried out with success yesterday by our aeroplanes, and several fights took place in the air, in the course of which four German machines were destroyed and three others driven down damaged.

MARCH 17th.—An encounter took place yesterday between a patrol of eight of our aeroplanes and 16 enemy machines. As a result of 20 minutes' fighting, the hostile formation was broken up, two German aeroplanes were destroyed, and two others were driven down damaged. All our machines returned.

MARCH 18th.—There was great activity in the air yesterday, and a number of large enemy formations were engaged by our machines and dispersed. In the course of the fighting seven hostile aeroplanes were brought down and nine others driven down damaged. Eight of our machines are missing.

MARCH 19th, 9.37 p.m.—Our aeroplanes did much valuable work yesterday in co-operation with our infantry. The enemy's troops were engaged successfully with machine-guns, and bombs were dropped on a number of places behind his lines.

In air fights one German machine was destroyed and one driven down undamaged. Two of our aeroplanes are missing.

WAR OFFICE COMMUNIQUÉS.

MARCH 16th, 11 a.m.—At 5.30 a.m. to-day a hostile aeroplane dropped some bombs at Westgate-on-Sea. There were no casualties, and the material damage caused was slight.

[Apparently the signal for the succeeding airship raid.—Ed.]

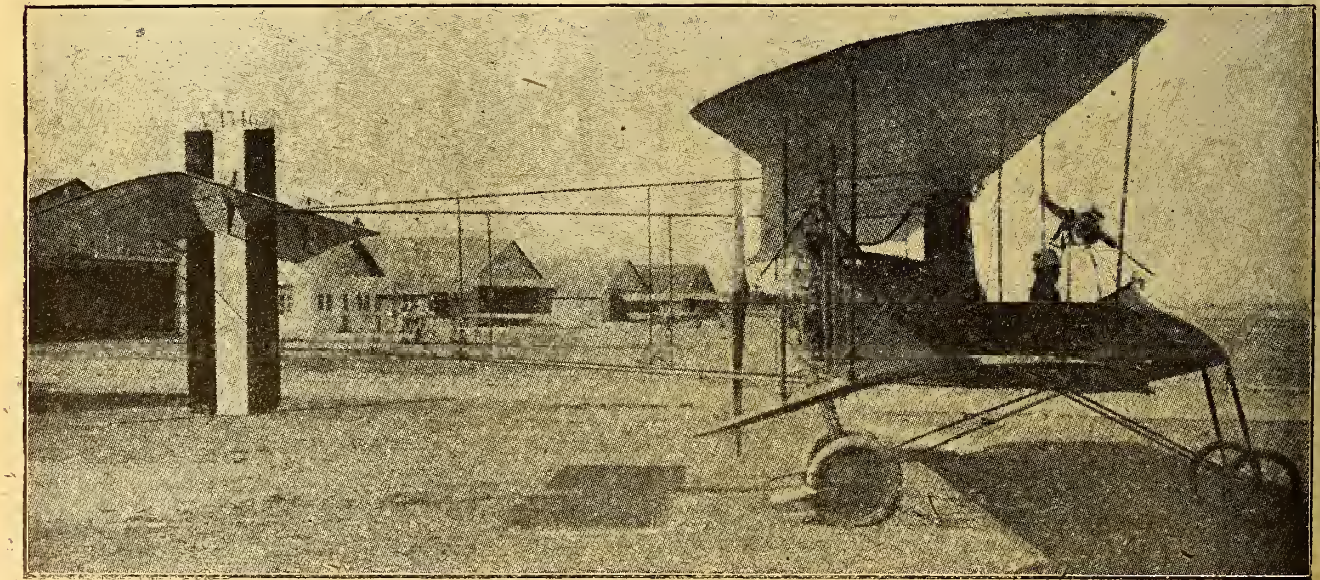
MARCH 17th, 12.30 a.m.—Hostile airships attacked the South-Eastern Counties last night. Bombs have been dropped in the County of Kent. The raid is still in progress.

A further communiqué will be issued in the morning.

THE CASUALTY LIST.

Reported March 14th.

KILLED.—Berridge, Sec. Lt. V. A., Bedford Regt., attd. R.F.C.
Bibby, Sec. Lt. G. M. G., R.F.C.
Gardner, Sec. Lt. W. S., R.F.A., attd. R.F.C.
Hills, Lt. W. F. W., R.F.C.
WOUNDED.—Crawford, Sec. Lt. O. G. S., R.F.C.
Fraser, Sec. Lt. S. McK., Highland L.I., attd. R.F.C.
Lockhart, Lt. J. W., R.F.C.
Pickthorn, Lt. C. E. M., A.S.C., attd. R.F.C.
Roe, Sec. Lt., P. J., Leinster Regt., attd. R.F.C.
MISSING.—Bloomfield, Capt. W. S., R., R.F.C.
Joyce, Sec. Lt. P. S., R.F.C.
Lonsdale, Sec. Lt. V. O., R.F.A., attd. R.F.C.
Ryall, Sec. Lt. A. G., Durham L.I., attd. R.F.C.



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Underwood, Sec. Lt. G. M., R.F.C.
Watts, Sec. Lt. A. E., R.F.C.

OVERSEA FORCES.—Killed.—Brichta, Lt. G. J. O., Canadian Mounted Rifles, attd. R.F.C.

Missing.—Pepler, Lt. S. J., Canadian Infantry, attd. R.F.C.
Stuart, Capt. J. D., Canadian Pioneer Bn., attd. R.F.C.

Died.—R.F.C.—Sharp, 45144, 2nd Air Mech. G. F. (Milngavie).

Reported March 15th.

Wounded.—Harrison, Sec. Lt. G. H., Middlesex Regt., and R.F.C.
Knight, Lt. O. R., R. W. Surrey Regt., attd. R.F.C.

Missing.—Graves, Maj. E. P., R.F.A., attd. R.F.C.
Hills, Sec. Lt. F. E., R.G.A., and R.F.C.
Mare-Montembault, Sec. Lt. M. J. J. G., Yeomanry and R.F.C.

Previously Reported Missing, now Reported Killed.—Lucas, Lt. T. C. H., Suffolk Regt., attd. R.F.C.

Prisoner in Turkish Hands.—Palmer, Sec. Lt. C. V., Norfolk Regt., attd. R.F.C.

Reported March 16th.

Previously Reported Wounded, now Reported Died of Wounds.—Simpson, Lt. G. K., R.F.C.

Previously reported Missing, now reported Prisoner in German Hands.—Mann, Sec. Lt. F. A., Suffolk Regt., attd. R.F.C.

Reported March 17th.

Killed.—McWha, Sec. Lt. A. J., R.F.C.

Previously Reported Missing, now Reported Killed.—Bennett, Lt. T. M., M.C., R. Irish Rifles, attd. R.F.C.

Wounded.—Neve, Sec. Lt. R. E., R.F.C.

Missing.—Haseler, Sec. Lt. G. F., R.F.C.
Pearson, Sec. Lt. A. J., M.C., R.F.C.
Shepard, Sec. Lt. T., R. Warwick Regt., attd. R.F.C.

Previously reported Prisoner, now reported Wounded and Prisoner.—Brown, Lt. A. W., Manch. Regt. attd. R.F.C.

Reported March 19th.

Killed.—Bowden, Sec. Lt. H. G. C., R.F.C.
Hoskins, Sec. Lt. G. C., R.F.C.
Lubbock, Capt. the Hon. E. F. P., M.C., R.F.C.
Stevenson, Sec. Lt. D. B., D.C.L.I., attd. R.F.C.
Thompson, Sec. Lt. J., R.F.C.

Died of Wounds.—Greenhow, Sec Lt. D. E., R.F.C.
Waner, Sec. Lt. G. R. F., R.E., attd. R.F.C.

Wounded.—Brebner, Sec. Lt. N. J., Lincoln Regt., attd. R.F.C.
Hardie, Capt. F. R., Hussars, attd. R.F.C.
Howe, Sec. Lt G., R.F.C.
Lewis, Sec. Lt. J. E., R.F.C.
Mayberry, Lt. R., R. Scots Fus., attd. R.F.C.
Turner, Sec. Lt. A. E., M.C., R. Warwick Regt., attd. R.F.C.

Missing.—Coops, Sec. Lt. F. C., Liverpool Regt., attd. R.F.C.
Headley, Sec. Lt. H. M., R.F.A., attd. R.F.C.
Hills, Sec. Lt. W. B., Hampshire Regt. and R.F.C.
Holden, Sec. Lt. A., Yorks Regt., attd. R.F.C
Shum, Sec. Lt. C. A. R., R.F.C.
Smyth, Sec. Lt. J., R.F.C.
Whitehead, Lt. A. D., R. Warwick Regt., attd. R.F.C.

Correction.—Hill, Sec. Lt. B. W., R.F.C. (reported killed), should read:—Hill, Lt. B. W., R.F.C.

Killed.—R.F.C.—Chalmers, 31384 2nd Cl. Air Mech. A. T. (Wilton, Birmingham); De Comeroy, 17691 Act. Cpl. E. (Kingston); Parkinson, 14417 2nd Cl. Air Mech. W. (Notting Hill, W.); Ward, 32758 2nd Cl. Air Mech. R. (Blackburn).

Died of Wounds.—R.F.C.—Clutterbuck, 41410 2nd Cl. Air Mech. G. (Ealing, W.); Tansley, 740 Flt. Sgt. R. J. C. (Shoreham).

Wounded.—R.F.C.—Davies, 15094 1st Cl. Air Mech. W. (Wellington, Salop); Dunn, 21983 2nd Cl. Air Mech. A. J. (Cardiff); Hemmings, 8996 Sgt. W. R. (Bath); Johnson, 30641 2nd Cl. Air Mech. N. (Southport); Skelf, 26812 2nd Cl. Air Mech. H. S. (Ware); Swingler, 5528 Sgt. W. (Kettering); Underwood, 14079 2nd Cl. Air Mech. A. (Birmingham).

OVERSEA FORCES.—Killed.—Simpson, Capt. F. I., Canadian Mtd. Rif., attd. R.F.C.

Reported March 20th.

Killed.—Hampton, Sec. Lt. G. W. B., Suffolk Regt. and R.F.C.

Wounded.—Davies, Sec. Lt. L. C., M.C., Cameronians and R.F.C.
Randall, Sec. Lt. A. C., R.F.C.
Robb, Capt. J. M., Northumberland Fus. and R.F.C.
Whitworth, Lt. W. H. A., M.C., Dorset Regt. and R.F.C.
Young, Sec. Lt. W. A. G., R.F.C.

Missing.—Byrne, Sec. Lt. E., Gordon Highrs. and R.F.C.

Previously reported Missing, now reported Killed.—R.H.A., attd. R.F.C.—Harrison, 80047 Act. Bdr. A. (New Cavendish Street, W.).

INDIAN FORCES.—Killed.—Short, Lt. C. W., M.C., I.A. Res., attd. R.F.C.

Wounded.—Rattray, Lt. A. R., R. Indian Marine, attd. R.F.C.

Prisoner in Turkish Hands.—Floyer, Lt. E. A., I.A. Res., attd. R.F.C.

PERSONAL NOTICES.

Deaths.

BENNETT.—Lt. Trevor Moutray Bennett, M.C., Royal Irish Rifles, attached R.F.C. (missing, now reported killed), was awarded the Military Cross last October "for conspicuous gallantry in action. When his platoon had suffered heavy casualties he rallied all available men, and got them forward into the enemy's lines. Later, when put in charge of an attack, he reached his objective, consolidated it, and held it against repeated bombing attacks."

* * *

DOUGLAS.—Sec. Lt. Archibald Douglas, R.F.A., attached R.F.C., who was reported missing on Oct. 16th, has now been reported killed on that date. He was a son of Capt. R. Langton Douglas, Director of the National Gallery of Ireland, who is now a Staff Captain at the War Office. He was educated at Tonbridge School, where he played for the first fifteen, and was senior cadet officer of the O.T.C. In 1914 he won an open scholarship at Trinity College, Oxford.

When war was declared he was 17 years of age, and, therefore, remained in his school cadet corps until June, 1915, when he was given a commission in the R.F.A. He proceeded to the front in November, 1915, and in June of the following year joined the R.F.C., becoming a qualified observer two months later. On Oct. 16th of last year he was engaged in a reconnaissance above the German lines, when his machine was brought to the ground by anti-aircraft fire.

An officer of his squadron writes:—"His loss is very keenly felt by the whole squadron. He was an extremely plucky and unselfish fellow; and it was in the interests of others that he volunteered for his last job."

* * *

FERGUSON.—Sec. Lt. James Ferguson, R.F.C., who has been killed in a flying accident in Yorkshire, was 18 years of age, and was the only son of Mr. and Mrs. James Ferguson, of The Cedars, High Wycombe. Educated at Godstowe School, High Wycombe, and Winchester, he left Winchester before completing his school career in order to take a commission in the R.F.C. some months ago. In his school work he was most successful, and was also known as a fine athlete. The funeral took place at Wycombe Parish Church on March 16th, with full military honours.

* * *

FOWLER.—At an inquest held on March 10th concerning the death of Lt. David Donnys Fowler, R.F.C., the jury returned a verdict of accidental death. He was a native of Rottingdean, Sussex, and was only 19 years of age. Educated at Trinity College, Cambridge, he joined the R.F.C. in March, 1915, and saw service on the Macedonian front, where he was wounded in November, 1915.

* * *

GARDNER.—Sec. Lt. W. Sutton Gardner, R.F.A., attached R.F.C., killed in an aerial combat, aged 19, was the only son of Mr. and Mrs. Sutton Gardner, of Laurel House, Cheltenham. He was educated at Cheltenham Grammar School and the Dean Close Memorial School, and was a keen member of the O.T.C.

He abandoned a University medical career, after passing his Cambridge entrance examination, to enter the R.M.A., Woolwich, in February, 1916, and after receiving his commission in the R.F.A. he responded to a War Office appeal for volunteers as observation officers for the R.F.C. He went abroad early in December with his squadron, of which he was the intelligence officer. His machine was shot down on March 6th, both observer and pilot being killed.

* * *

GRAY and MORRISON.—On March 18th Sec. Lt. W. S. Morrison and Sec. Lt. J. J. E. Gray, R.F.C., were killed in an accident on the South Coast, one being thrown out of, and the other falling with, the machine.

* * *

GREENHOW.—Sec. Lt. Denys Edward Greenhow, R.F.C., younger son of the late Rev. E. H. Greenhow, vicar of Chideock, Bridport, was born in 1897, and educated at Lancing College, where he was sergeant in the O.T.C. He was gazetted to the R.F.C. in July, and went to the front as an observer early in October. On March 6th, he was attacked by five enemy machines and wounded by gunfire, dying soon afterwards. His pilot, who was unhurt, succeeded in landing safely.

* * *

GOSSETT-BIBBY.—Sec. Lt. Gerald Maurice Gossett-Bibby, R.F.C., who was killed on March 6th, was the only son of the Rev. A. G. Gossett-Bibby, late headmaster of Kimbolton Grammar School, and Mrs. Gossett-Bibby, of 11, St. Augustine Road, Bedford. Born in 1897, he was educated at Wells House School, Malvern Wells, and Oundle, where he was in the O.T.C. In the first year of the war he enlisted in the R.F.C., and was an observer during the advance on the Somme in July, 1916.

For distinguished service in the field he was granted a com-

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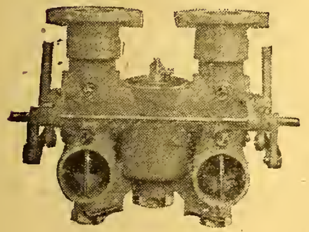

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mission in the R.F.C., and returned to England to train as a pilot. He was gazetted as a flying officer and was ordered to the front last month. His commanding officer writes:—"During the short time that he was with us he showed exceptional promise, and I was hoping great things of him."

* * *

HAMPTON.—Sec. Lt. George William Betts Hampton, Suffolk Regt., attached R.F.C., aged 31 years, was killed in action on March 11th.

* * *

HORN.—Sec. Lt. E. Eric Horn, Middlesex Regt. and R.F.C. (killed), was 19 years of age. He was the fourth son and youngest child of Mrs. Horn, of High Beech, Essex, and the late Mr. John Horn, of Loughton and North Weald, Essex, the well-known poultry breeder and judge. Educated at Loughton School Essex, he volunteered on his 17th birthday for the R.A.M.C., and after three months' training proceeded to the front, where, after being gassed, he was given a commission in the Middlesex Regt., with which unit he went through all the heavy fighting of last year. In December last he was transferred to the R.F.C., still remaining at the front. His commanding officer writes:—"He was just the stamp of boy officer the British Army can ill afford to lose at such a time as this."

* * *

HOSKINS.—Sec. Lt. George Chandos Hoskins, R.F.C., was killed in action on March 11th, 1917. He was the only son of Mr. and Mrs. G. T. Hoskins, 11, Wellfield Avenue, Muswell Hill, N., formerly of "Windermere," Winchmore Hill, N., and was aged 24.

* * *

JOHNSON.—Sec. Lt. Pieter Cedric Earlam, R.F.C., killed in action on Jan. 20th, was the fourth son of the late A. E. Johnson, of Bickershaw Hall, near Wigan, and Mrs. Johnson, "Rokeby," Ellesmere Park, Eccles. His age was 18.

* * *

LASCELLES.—Lt. Harold Leslie Lascelles, R.F.C., whose death in an accident was recorded in THE AEROPLANE last week, was 25 years of age. He was educated at St. Paul's School, and on the outbreak of war joined the Inns of Court O.T.C., obtaining a commission in the Yorkshire Regt. in July, 1915. He transferred to the R.F.C. in the following Oct., and proceeded to Egypt in Jan., 1916, taking part in several of the operations in that theatre of war. He was promoted lieutenant on April 1st, 1916, and returned to England in July, 1916. He was just on the eve of proceeding to the front when he was killed.

A senior officer who knew him intimately writes:—"Lascelles had a most lovable and sympathetic disposition, and made hosts of friends wherever he served. He had a fine taste for literature, and his letters from Egypt are worthy of more permanent record. His early death, when he had every prospect of a promising career, is deeply regretted by all who knew him."

A verdict of accidental death was returned at Hounslow, on March 13th, at an inquest on the body of Mr. Lascelles. The evidence showed that deceased had lost one of the control bars (?) and this caused his machine to overbalance, bringing him suddenly to the ground, with the result that his neck was broken. One witness suggested that it was dangerous for flying officers to be transferred from one type of machine to another, but in reply it was pointed out that every officer had to learn to use different types of machines. Deceased had been in this machine before, and knew it well.

* * *

LUBBOCK.—Capt. the Hon. Eric Fox Pitt Lubbock, A.S.C. and R.F.C., who was killed on March 11th, aged 23, was the son of the late Lord Avebury and of Lady Avebury and brother of the present baron. He was educated at Eton and Balliol.

On the outbreak of the war he enlisted in the M.T. section of the A.S.C., with which he went to France in Sept., 1914. Later he was given a commission in the A.S.C., but soon became attached to the R.F.C., with which he saw the bulk of his service.

He remained at the front as an observer and was awarded a Military Cross for conspicuous gallantry and was twice mentioned in dispatches. He returned to England and, obtaining his pilot's certificate, was retained in this country a short time on instructional work, but last October went back to the front in command of a flight.

A friend sends this tribute:—"To few young men does it fall, as will fall to him, to be mourned in death by so large a circle of devoted friends of all ages, even as few in life can hope to prove so constant a source of hope, comfort, and inspiration to all with whom they come in contact."

* * *

MACKEY and RAINE.—On March 16th a verdict of "Death from misadventure" was returned at the inquest on the bodies of Lt. E. R. Mackey and Sec. Lt. G. S. Raine, R.F.C., who were killed in an accident in Hertfordshire. Their machine when descending came into collision with another at a height of 800 ft.

The second machine, after being twice righted, came into contact with an oak tree and fell, the pilot, Lt. W. G. Potts, being injured.

MURRAY.—Lt. L. Murray, attached to the R.F.C., was killed in an eastern county on March 13th. He had safely alighted from his machine, but was struck by the propeller and injured fatally. A verdict of "Accidental Death" was returned at the inquest on March 15th.

* * *

RAINE.—Sec. Lt. G. S. Raine, R.F.C., who has been accidentally killed, was the eldest son of Mrs. Raine and the late Thomas Raine, 54, Lyncroft Gardens, Hampstead.

* * *

SHORT.—Lt. Cuthbert William Short, M.C., Indian Army Reserve of Officers, attached R.F.C. (killed in action), was awarded the Military Cross in September last year "for conspicuous gallantry and skill. On one occasion, when our cavalry were held up by machine-gun fire, he, with Capt. Miller as pilot, came close to the ground, and flew several times along the line of hostile machine-guns, drawing their fire, and engaging them with his Lewis gun, thus enabling the cavalry to advance."

* * *

SIMPSON.—Lt. George Kenneth Simpson, R.F.C., who died of wounds on March 7th, aged 26, was the youngest son of the late Henry John Simpson, of Liverpool, and Mrs. Simpson, of Brentwood, Beckenham, Kent, and Vancouver, B.C. Educated at Dulwich College, he went out to Vancouver, and returned home soon after the outbreak of war. He received his commission in the R.G.A. in March, 1915, and in October he went into the R.F.C., being posted to the Kite Balloon Section as observer in March, 1916. He left for the front on May 25th, and was gazetted Balloon Commander on March 6th last.

A brother officer, writing of him, says:—"Simpson's accident was due to his own gallantry . . . in waiting till the air mechanic who was with him was clear of the balloon, which was in flames, before he himself jumped. . . . If ever a man deserved honour it is dear old Simpson. . . .

"The flaming balloon suddenly dropped, overtook Simpson, set fire to his parachute, and the whole lot dropped blazing to the ground." This was his second parachute descent.

* * *

SUTTON GARDNER.—Sec. Lt. William Sutton Gardner, R.F.A., attached R.F.C., killed in action on Jan. 28th, was the only son of Mr. and Mrs. Sutton Gardner, Laurel House, Cheltenham. His age was 19.

* * *

THOMPSON.—Lt. John Thompson, R.F.C., who has been killed in action, was the youngest son of Mr. John Thompson, of West Park, South Shields. He was 22 years of age, and joined the Tyneside "Commercials" soon after the outbreak of war. Mr. Thompson had seen service at Gallipoli.

* * *

WALKER.—An inquest was held at Cirencester on Mar. 17th on the body of Sec. Lt. James Hope Walker, R.F.C., aged 20, son of Mr. Walker, of Symonds Hythe, Hatfield, who was killed in a flying accident the previous day. Mr. Walker had qualified as a pilot, and on March 16th, about 11.40 a.m., he went up for a practice flight. He was being watched by Capt. Johnson, and all seemed to be going well. He was seen to be preparing to descend, when he suddenly took too flat a turn, and about a hundred feet from the ground the machine lost speed and nose-dived. Mr. Walker was found to be dead, having sustained dislocation of the neck and a fractured skull. A verdict of accidental death was returned.

A Memorial Service for Capt. Lubbock was held in the Grosvenor Chapel, South Audley Street, this afternoon, March 21st.

ENGAGEMENT.

MINCHIN—FULLER.—The engagement is announced, and the marriage will take place in May, between Capt. James Humphrey Cotton Minchin, the Cameronians and R.F.C., only son of Mr. and Mrs. James Cotton Minchin, The Green, Wimbledon Common, and Violet, third daughter of Mr. and Mrs. Claude Fuller, and granddaughter of Mr. and Mrs. Beaumont, Buckland Court, Betchworth, Surrey.

MARRIAGES.

LEWIS—RIDDALL.—On March 13th, at the Red House, Milliken Park, by the Rev. J. Johnstone Wright, Senior Chaplain Indian Ecclesiastical Establishment, assisted by the Rev. R. D. MacKenzie, B.D., Stanley Evlyn Lewis, Lt. R.F.C., youngest son of Colonel John Lewis, C.M.G., Union Defence Force, S.A., to Elizabeth Spence Riddall, daughter of the late John Riddall, M.D., Ayr.

* * *

MARTYN—COLQUHOUN.—The marriage arranged between Capt. (temp. Lt.-Col.) R. Barry Martyn, M.C., R.F.C. and Wilts. Regt., and Miss Nina Colquhoun, took place at St. James's, Westbourne Terrace, at 1.45 p.m., on March 16th.

* * *

WELLESLEY—WELLESLEY.—The marriage took place at St. Thomas's Church, New York, on March 12th, of Major Lord

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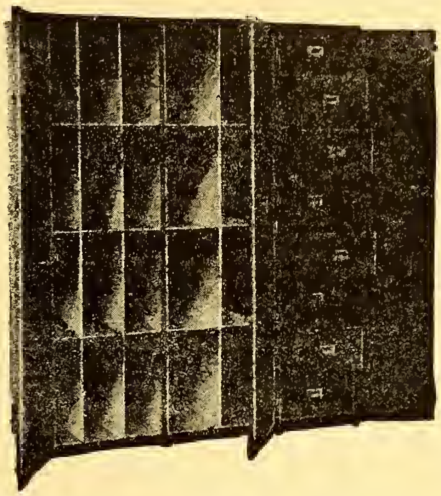

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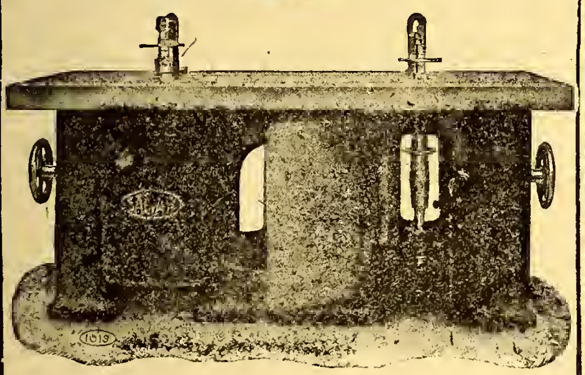

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George Wellesley, M.C., R.F.C., and Lady Richard Wellesley, widow of Lord Richard Wellesley, Grenadier Guards, who was killed at the first Battle of Ypres in 1914.

Lord George Wellesley's appointment in the Flying Corps necessitates his remaining temporarily in Canada, but his permanent home will be from now on in the United States.

BIRTHS.

BRADLEY.—On March 11th, at 6, Kensington Square Mansions, W., the wife of Major R. A. Bradley, North Staffords and R.F.C., of a daughter, still-born (premature).

* * *

BURCHER.—On March 7th, at Kidderminster, to Mary Wase, wife of Lt. L. Corbet Burcher, R.F.C.—a daughter.

* * *

HOPKINSON.—On March 14th, at 10, Adams Road, Cambridge, the wife of Major B. Hopkinson, C.M.G., D.A.D.A.E., R.F.C., of a daughter.

* * *

O'BRIEN.—On March 16th, at 38, Nevern Square, S.W., the wife of Capt. (temp. Major) A. K. O'Brien, of a son.

FRANCE.

OFFICIAL COMMUNIQUÉS.

MARCH 17th.—During yesterday our aeroplanes de chasse were particularly active.

Numerous engagements were fought by our pilots, in the course of which eight enemy machines were brought down. Three of these machines were brought down by Capt. Guynemer, and fell in flames within our lines. These bring up to 34 the number of German machines brought down by this officer up to the present.

Lt. Doullin also brought down within our lines yesterday his 12th machine. A ninth machine, struck by our anti-aircraft guns, came crashing to the ground in the region of Corbeny (south-east of Laon).

During the night of March 16th-17th our air squadrons bombarded the enemy organisations in the region of Arnaville and the blast furnaces and factories of Völklingen (north-west of Saarbrücken), where a great conflagration was observed, as well as the stations and roads of the region of Ham and St. Quentin. All our machines returned unscathed.

MARCH 18th.—In the course of yesterday, Capt. Guynemer brought down his 35th enemy aeroplane, and Capt. Doumer his sixth. Two other enemy machines attacked by our pilots crashed to the ground—one north of Cerny-en-Laonnais and the other east of Roye.

According to further information, a 10th aeroplane, which fell near Chavonnes (?Chavonne, south of Laon), has to be added to the nine German aeroplanes brought down by us on the 16th.

This morning, at about 5.30, Zeppelin L.39, which had flown over the region of Paris, was hit at a height of 3,500 metres (between 11,000 and 12,000 feet) by our anti-aircraft guns above Compiègne.

L.39 fell in flames in the town gardens. Neither the fall of the airship nor the explosion of her bombs did any damage. All the members of the crew of the ship perished.

MARCH 19th.—Yesterday Adjudant Madon attacked at very close quarters and brought down his eighth German aeroplane. On the same day another enemy machine, after fighting with one of our pilots, came crashing to the ground west of Altkirch. It is confirmed that another German aeroplane was brought down last Saturday north of Cerny-en-Laonnais.

On Saturday evening and in the night of the 17th-18th our air squadrons bombarded the factories and foundries of Thionville and the Briey basin (respectively north and north-west of Metz) and convoys and enemy troops on the march in the region of Guiscard (north-east of Noyon).

* * *

Reports from Paris say that on March 17th a Zeppelin was brought down at Compiègne, making, with those destroyed at Badonvillers and Révigny, a total of three accounted for on the soil of France.

The Zeppelin was first seen above the town at 6 o'clock in the morning, hovering at a height of about 9,000 ft., and pursued by a French aeroplane. Except for the slow rate at which it was carried along by the light west wind it was practically motionless, and apparently something had gone wrong with the engines.

The anti-aircraft batteries hit the Zeppelin aft with an incendiary shell, after ten minutes' practice. There was an instant outburst of flame, which extended rapidly the whole length of the envelope, and then the whole structure buckled and collapsed, and fell to the ground.

* * *

Reuter's Correspondent in Paris sends the following account of the crisis in the Service d'Aviation Militaire.

General Lyautey, the Minister of War, has resigned. M. Briand, the Premier, announced the resignation to his colleagues at a Cabinet meeting on March 15th, and submitted for President Poincaré's signature a decree entrusting Admiral Lacaze, Minister of Marine, with the post of Minister of War ad interim.

The resignation is the sequel to a debate in the Chamber of Deputies on March 14th on the subject of military aviation. A secret sitting was first held, and when the public sitting was resumed in the evening the President read the various resolutions that had been submitted. The Government accepted that of M. Eynac, which took note of the Government's statement and looked to it to carry out the close co-ordination of the various air services and to intensify all forms of aerial warfare.

General Lyautey, the Minister of War, said that he had thought it better that there should be no debate, as it was advisable to wait and see what results were obtained from the measures which had been taken. He would not, however, follow the speakers on the technical points raised even in the secret Committee, as that might endanger the national defence.

The words of General Lyautey were received with loud cries of protest. Some of the Deputies demanded that he should be called to order, while others declared that he had insulted Parliament. The protests continued, in spite of the appeals of M. Deschanel, the President. M. Renaudel submitted a demand for a secret sitting, which was adopted, and the sitting was suspended at 9.40 p.m.

When the public sitting was resumed at 10.45 several Deputies demanded that the Order of the Day pure and simple should be taken, as the Minister for War had not spoken in the secret Committee and was no longer on the Government benches.

M. Briand, the Prime Minister, at the conclusion of the debate, paid a tribute to the dignified character of the discussion in the secret Committee. He said: "I ask, as a proof of the complete solidarity between the members of the Chamber and the Government, a vote on the Order of the Day pure and simple, this Order of the Day having the same meaning as that submitted by M. Eynac, which paid a just tribute of admiration to our heroic aviators." M. Briand expressed the hope that the Chamber would support it unanimously. (Cheers from all parts of the Chamber.) Afterwards the Order of the Day pure and simple was, as desired by M. Briand, unanimously adopted, and the Chamber adjourned at 11.20 p.m.

The "Morning Post" Correspondent, who is usually very well informed on French politico—military affairs, and may be accepted as accurate, says:—

The resignation of General Lyautey late last night came as a complete surprise, not only to the country, but to the Chamber of Deputies. In view of the attitude taken up by him his fall was inevitable, because he definitely informed the Deputies that it was not possible for him to tell them even in confidence at the secret Session the real situation as regards the aviation service. It is possible that General Lyautey's words were unfortunately selected, and that the written statement which he began to read out to the Chamber contained a paragraph that explained away what was naturally interpreted by the Chamber as a definite insult to that body.

The net result of the episode is that M. Briand has unquestionably gained in prestige. For instance, at to-day's sitting of the Chamber, when the method in which the "Figaro" had commented on his position was under discussion, M. Briand's reply was listened to with the utmost sympathy, and there can be no question that the Premier, by publicly insisting on respect for the privileges of Parliament, has won over many of those who before yesterday's sitting would have liked to see a change of Government.

It is probably difficult for English opinion to realise how closely wedded France is to a Parliamentary régime. There are those in France to-day who regard this devotion to Parliamentarianism as a source of weakness, but from the standpoint of the Entente it has had the advantage that France has thoroughly appreciated the importance of the sacrifice made by Great Britain in modifying the whole character of its Parliamentary Government during the war.

Ever since the beginning of the war the whole question of aviation has been closely followed in France, and has been subject to much, and frequently deserved, criticism, not only by the Press and the general public, but by Parliamentary Committees. Now M. Lasies has brought before the Chamber of Deputies a Bill to ensure that military aeronautics shall constitute a special arm, both as regards organisation and military service.

It is pointed out generally that entrance to the aviation service is made by many different avenues, and that in consequence promotion is often entirely arbitrary and based on the practice of the special arm to which an aviator belongs. Further, the development of aviation has been so rapid that it is thought by many people in France that the air service should be as complete a unit as the Army or Navy, and it is the opinion of M. Lasies that by remodelling the service on the lines proposed the abuses that result from attempting to fit old institutions to new conditions can be avoided.

[Since the above was written M. Briand has also resigned and M. Ribot has formed a new Cabinet, with M. Painlévé as War Minister, and M. Daniel Vincent, Under Secretary for Aviation.—Ed.]

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WEYBRIDGE,
SURREY.

Adjudant Raoul Lufbery, an American Aviator, serving with the French Army, who up to Dec. 27th last had brought down six enemy aeroplanes, has received the Cross of the Legion d'Honneur. He had already received the Medaille Militaire.

* * *

Frankfort-on-Main was bombarded, for the first time, on March 18th, by a French aviator, who dropped five large bombs. An official report says this was a reprisal for the burning of Bapaume.

* * *

His many friends in London will be glad to hear that Lieut. Louis Noel, of the Service d'Aviation Militaire, has been awarded the British Military Cross by the General Officer commanding at Salonika. The following citation appeared in Army Orders :—

"Pour vaillance et dévouement dans l'accomplissement de son devoir. Cet officier a rendu pendant cinq mois la plus grande assistance à l'Armée Britannique par son travail de co-operation avec l'artillerie et de reconnaissances. Son energie a été infatigable et son travail des plus pénibles a été de la plus grand valeur."

Which, being interpreted, reads :—"For valour and devotion in the accomplishment of his duty. This officer has rendered during a period of five months the greatest assistance to the British Army by his work of co-operation with the artillery and of reconnaissance. His energy has been indefatigable and his work of the most trying nature has been of the greatest value."

GERMANY.

Official Communiqués.

March 13th.—Our air squadrons secured hits by bomb attacks on the railway station of Vertekop (south-east of Vodena). Serious fires could be observed as a result of these attacks.

March 17th.—"On Friday morning one of our naval aeroplanes successfully dropped bombs on the railway station and sheds at Margate. Two large fires were observed from the aeroplane."

Western Front.—Our aviators brought down four enemy captive balloons in flames.

March 17th.—"One of our naval airship squadrons, in spite of violent counter-attacks by hostile aviators and anti-aircraft guns, successfully dropped bombs on London and the south-eastern counties during an attack lasting half-an-hour. Our airships returned safely.

"According to French reports, L 39 was brought down by French anti-aircraft guns near Compiègne, to the north-east of Paris, at an altitude of 3,500 metres.—(Signed) Chief of the Naval Staff."

March 18th.—From the coast as far as the Oise the clear weather resulted in increased aerial activity. The enemy lost 19 aeroplanes in aerial encounters and three by anti-aircraft fire. Lt. Baron von Bichthofen shot down his 27th and 28th opponents. Lt. Baldamus defeated his 14th and 15th opponents. We lost three aeroplanes.

RUSSIA.

Official Communiqués.

March 14th.—Enemy aeroplanes dropped over 60 bombs on Radziviloff station (north-east of Brody).

March 17th.—South-east of Smorgon, a German aeroplane was brought down by our aviators, Ensign Thomson and Rosenfeld. The machine was smashed and the occupants were killed.

March 18th.—In the region south-west of Riga bombs were dropped by a Zeppelin.

ITALY.

Official Communiqués.

March 14th.—Enemy aircraft dropped bombs on Gorizia, causing a few casualties among the inhabitants.

March 19th.—The fine weather prevailing was favourable to aircraft, and after a brisk fight we brought down two enemy aeroplanes, one of which fell within our lines.

Last night one of our airships, in spite of a strong headwind, succeeded in dropping a ton of high explosives on the railway station of Galliano (Lagarina Valley) and on the railway line to the north in the direction of Mattarello (Adige, four miles south of Trent), with good results. The airship escaped from the heavy fire of anti-aircraft artillery and returned safely.

A squadron of enemy seaplanes dropped bombs on the lagoon of Grado (Gulf of Trieste), but there were no casualties and very slight damage was done.

* *

A well-known military pilot whose ticket dates from 1910 points out in an article in our only Aero journal that the usual barograph is merely a useless and lying prophet in the highlands where war is now being held. A self-registering instrument might really be a help in calculating when to release bombs, etc. However, when the mountain tops have been all levelled and made into nice aeroplane-bases, and the bombing arrangements are all quite perfected, we shall have universal disarmament or some similar fly-in-the-ointment to grumble at.

The same pilot disapproves of the one-manned hunting-plane as being a waste of a man, a machine, and a gun.—T. S. H.

ROUMANIA.

Official Communiqué.

March 13th.—In the Braila region two of our battleplanes engaged and brought down two enemy aeroplanes, which fell in flames. On the Danube as far as the Black Sea quiet prevailed.

SERBIA.

Official Communiqué.

March 13th.—Yesterday there was great activity on the part of the opposing air services. Enemy aviators again bombarded the field hospitals at Vertekop (near Vodena) and caused casualties among the patients and members of the hospital staff. Two British nurses were killed. The hospitals at Vertekop are completely separated from the other encampments, and are distinctly marked with the Red Cross. It is evident that the enemy bombarded them intentionally.

NORWAY.

The following Reuter story comes from Norway :—

Lt. Tryggve Gran, who has won some renown in connection with Polar exploration and also by a remarkable aeroplane flight over the North Sea, has been ordered to resign from the Norwegian Flying Corps owing to his having, contrary to orders, appeared in uniform in a foreign country. The offence was aggravated by the fact that it was a military uniform of a foreign Power which he wore, and was that of a captain. Lt. Gran had no training as an officer. His commsission was given him in recognition of his North Sea flight.

[Capt. Gran was with Capt. Scott on his last voyage to the Antarctic, and did very good work. He is a well-to-do sportsman who learned to fly at Hendon, and did much to cause interest in aviation in Scandinavia by his flight from Scotland to Norway not long before the war. One is under the impression that if he was not actually an officer in the Norwegian Navy when with Capt. Scott, he was given a Naval commission for his Antarctic service, and not for the Scotland-Norway flight. Many of Capt. Gran's friends in this country will enjoy the jest about the uniform.—Ed.]

HOLLAND.

The "Handelsblad" of March 14th stated that on March 13th a German aeroplane, while flying over Sluis (on the frontier), was fired at by Dutch troops who were drilling near the Terhofstede fortifications.

The German aviator, who was seen to be wounded, landed in Dutch territory, but had sufficient strength to re-start his machine and descend again 300 yards beyond the frontier demarcation wire in Belgian territory. German troops hastened to the assistance of the wounded aviator, who was last seen being carried away by a Red Cross detachment.

A later report states that the pilot died of his wounds at Knocke.

THE ROYAL AERO CLUB COMMITTEE.

As this paper goes to press, the result of the election for nine new members for the Committee of the Royal Aero Club is announced as follows :—

Brigadier-General W. S. Brancker, R.F.A.
Flight Commander John Dunville, R.N.
Wing Commander Spenser D. A. Grey, D.S.O., R.N.
Colonel Sir Capel Holden, R.E., K.C.B., F.R.S.
Wing Commander A. M. Longmore, R.N.
Squadron Commander F. K. McClean, R.N.
Colonel E. M. Maitland (Wing Capt., R.N.A.S.).
The Lord Northcliffe.
Wing Commander Alec Ogilvie, R.N.

Though one is glad to see all these distinguished gentlemen on the Committee, it is greatly to be feared that few of them will be able to attend meetings regularly, and consequently the prospect of much improvement in the activities of the Club seems less than might have been.

MORE AIRCRAFT IN THE HOUSE.

On March 19th **Mr. Bonar Law**, answering **Mr. Pemberton-Billing**, who asked whether, following the decision of the French Government, he would grant a secret Session of the House to be devoted entirely to a discussion of the Air Service, said he did not think there was any advantage in adopting the suggestion, or that it would commend itself to the House.

* * *

Mr. Billing (Herts, E., Ind.) asked the Under Secretary for War why the Commander-in-Chief of the Home Forces failed to comply with his own announcement that he would issue a second communiqué on the Zeppelin raid last Friday night.

Mr. Macpherson : There was, and is, nothing to add to the information which had been given in the communication. No lives were lost and practically no damage was done. In the circumstances the Field-Marshal decided that a second communiqué was unnecessary, a course with which I am sure the House will agree.

Sir A. Dalziel (Kirkcaldy, L.) suggested whether, when a definite announcement was made that a further communiqué would

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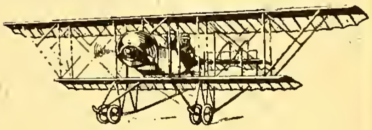

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be forthcoming, it would not be right and proper to say that there was no further information.

Mr. Macpherson was understood to say the suggestion would be considered.

MORE AERONAUTICAL SOCIETY ACTIVITIES.

The activities of the Aeronautical Society of Great Britain are spreading rapidly. In addition to the meetings at the Society's headquarters a series of lectures at Hendon have already been notified. Over and above these a series of lectures have been arranged at Cardiff at the request of the Technical College in that city. The first meeting was held on March 10th, when Mr. A. Fage, A.E.S., lectured on the Airscrew, and on the 17th Capt. F. S. Barnwell, R.F.C., lectured on the Modern Aeroplane. There was a magnificent attendance, something like 500 auditors being present. It is hoped that similar lectures in the ægis of the Aeronautical Society will be arranged.

A CORRECTION OF HISTORY.

Apropos the question of flying aeroplanes off moving ships, to which reference was made lately, one of those who was present at the time states that the first flight of this nature was made by Lieut. C. R. Samson, R.N. (now Commander and D.S.O.). He flew a land-going biplane, fitted with air-bags on the skids to prevent it from sinking, off the deck of H.M.S. "Hibernia," early in May, 1912, the machine being the original S.38 Short biplane. This feat was performed early in the morning when the ship was steaming into Weymouth Bay to join the rest of the Fleet for the King's Review. The next flight of this nature was made by Lieut., now Commander, L'Estrange Malone, R.N., from H.M.S. "London," in the vicinity of Portsmouth, some three months later.

MACHINE-GUNS IN ACTION.

"Whitehall Series of Lectures, No. 7. Machine Guns and their Uses." By "Simplex." Published by Foster Groom and Co., Ltd., 1917. Pp. 44. Post free 1s. 3d. from the Wm. Dawson Publishing Co., Ltd., 2, Breams Buildings, E.C.4.

Prominent among the lessons in the Art of War, for which a degree of gratitude is owing to the Armies of Germany, is the effective use in battle of the machine-gun. In previous wars this weapon had been employed on a small scale, but with no real appreciation of its true advantages, save, perhaps, by the detachment in whose care it was placed. The unreliable types which first came into use brought in their train a series of minor disasters which adversely affected their military popularity. A gun which fires swiftly and surely at moments when danger is not imminent and jams with a disconcerting certainty in the time of crisis loses attraction for those whose lives are part of the cost.

But the progress of the past twenty years has given to the machine-gun a degree of precision which should have caused its adoption in large numbers by modern armies. There is little doubt that had the military advisers of the Secretary of State for War not been overruled by the Finance Department the British Army would have been adequately equipped in the years immediately preceding the war.

The pamphlet under review does not deal with the mechanism of the modern machine-gun, and it has no appendix of charmingly complicated line drawings of lethal interiors. It deals with the

SCENES IN AN AIRCRAFT FACTORY.—X.—THE FITTING SHOP.—In the foreground on the left we find two workmen taking a heavy tub full of fittings "for inspection." Facing them to their right is another worker returning "from inspection" with an empty tub on his head, and the one fitting "passed" in his hand, the rest of the tub-full having been, presumably, rejected. On the right is a charge-hand giving a friendly welcome to a new man, who seems painfully surprised at being allocated to the other end of the shop.

Behind the right-hand bench is a naughty shop-boy who is causing severe pain with a pea-shooter to a worker who is passing peacefully along the central passage. On the same bench is an energetic hand engaged in marking out a steel sheet, regardless of burring over the head of the centre-punch and buckling the sheet. Beyond him, a charge-hand gives the sack to an indignant fitter. On the left of the bench, another fitter is puzzled as to why steel is so hard to saw,—note the red-hot hack-saw, with the teeth the wrong way round. Beyond him, a middle-aged, middle-class National Service man endeavours to drill a chunk of steel with a hand-brace. And, beyond him, again, a nimble assistant tries to help a steel shear by leap-frogging on the back of it.

At the left bench a massive filer performs his task amid a cloud of sparks and whistling; and beyond him, a bantam fitter does his best under adverse conditions. On the outside of the bench, another National Service man operates effectively with a file. Beyond him, an experienced hand cuts off a piece of sheet by the usual method of file-cut-and-hammer, while an inexperienced person discovers, to his amazement, why his endeavours with a chisel are less effective.

On the outside left, the foreman indulges in a quiet snooze and smoke in his locked office, while a shop-boy keeps watch with binoculars for the advent of the works manager. Meantime, down the centre gangway rushes a man in a hurry, with a soldering iron, anxious to reach his work before the iron cools, and happily regardless of the victims bestrewing his path.

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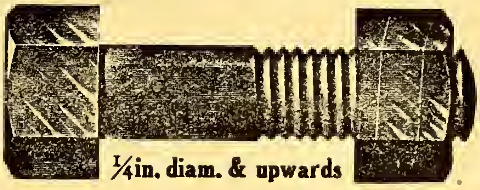

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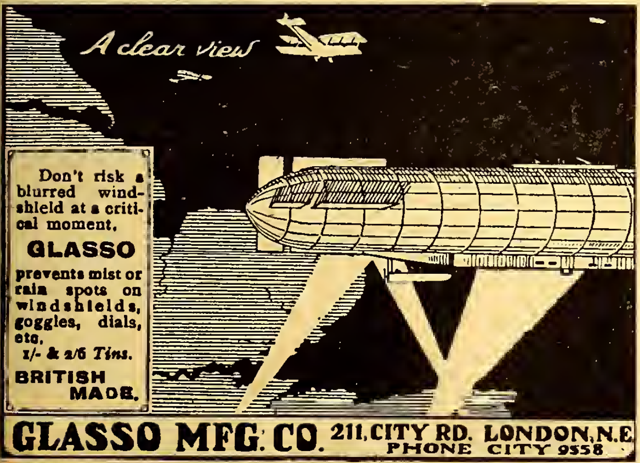

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tactical employment of the weapon under all conditions save those in aircraft.

The characteristics of the machine-gun are politely explained, and the methods and categories of fire are given in some detail. The distinction between "overhead" fire and "indirect" fire so readily confused by the amateur is given with clarity.

The most valuable part of the pamphlet is that dealing specifically with "The Tactical Uses of Machine-guns." The limitations of the weapon are recognised in a degree unusual to the machine-gun enthusiast. The Royal Regiment of Artillery will be relieved to read (p. 29): "When any position [enemy machine-gun position] has been discovered, it should be communicated to the artillery, who are the people most competent to deal with it."

The plans and letter press dealing with "diagonal" fire, and *en parenthèse* the power of enfilading an advancing enemy, are excellent. The section on "The Choice of Positions for Machine-guns" is of particular interest.

The pamphlet is valuable to the serious infantryman as an indication of what to avoid in the modern battle. No machine-gunner will regret its purchase, and those who intend to transfer to the Machine-gun Corps should not neglect to buy it.

PRESENTATION AEROPLANES.

The Secretary of State for the Colonies makes the following announcement :—

The High Commissioner for South Africa reports that the Paramount Chief of Basutoland has forwarded to him the sum of £40,000 as a gift from the Paramount Chief and the Basuto nation to the King for the purposes of the war. The gift has been warmly acknowledged on behalf of His Majesty, who has approved of the money being used for purchasing a number of aeroplanes.

INVASIONS OF ENGLAND.

Two or three Zeppelins visited the English coast on the night of March 16th. At about 11 o'clock, Zeppelin engines were heard over the Kent coast, the airships proceeding inland. Between that time and half-past one on Saturday morning similar sounds were heard twice more. From this fact it was assumed that there were three aircraft employed.

The "Daily Telegraph" says :—

"Prompt action was taken by those in charge of defence measures. About a dozen bombs exploded in fields at considerable distances apart." Which leaves one in doubt as to whether these were part of the "defence measures."

No casualties are reported.

* * *

A telegram from Amsterdam dated March 18th supplements the German official communiqué of March 17th by the following account, which is stated to be official :—

"The airships observed no less than 50 to 60 searchlights within the London area. By the aid of these lights they were hotly but fruitlessly bombarded with incendiary projectiles. Hostile aviators also took part in the attacks on the airships, without, however, succeeding in approaching them. The Thames could be distinctly seen, and also London, although the lights were darkened. During the journey back a heavy storm arose. The airships were vainly sought for by the searchlights of the Thames defences and by the British outposts."

* * *

A rhapsody on the Zeppelin which recently occupied a prominent place in the Berlin "Lokalanzeiger" seems to indicate misplaced prescience on the part of the "Lokalanzeiger's" tame prophet in foretelling the fortune of the latest Zeppelin venture.

"When in the blue sky of summer we behold a small white cloud sailing near the sun our breathing is suspended by the joy that fills our whole being, because we are aware that it is a Zeppelin that is passing on its way to scatter a frightful death, an immeasurable destruction—[Apparently the destruction in this case was absolutely immeasurable.—Ed.]—among our enemies on the other side of the Channel.

"A smile of infinite happiness will hover on our lips at the thought of the terror and boundless panic that the arrival of this most glorious product of German skill and science will create among that godless population of the monstrous Babylon of the Thames.

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A TELEGRAPHIC ADDRESS.

It should be noted that the telegraphic address of Imperial Light, Ltd., of 123, Victoria Street, S.W.1, is now "Edibrac, 'Phone, Landon," instead of "Edibrac, Sowest, London."

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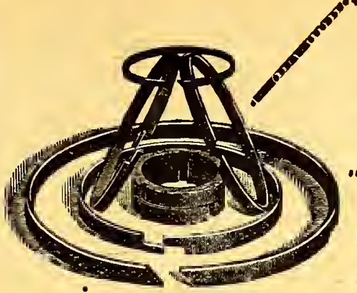

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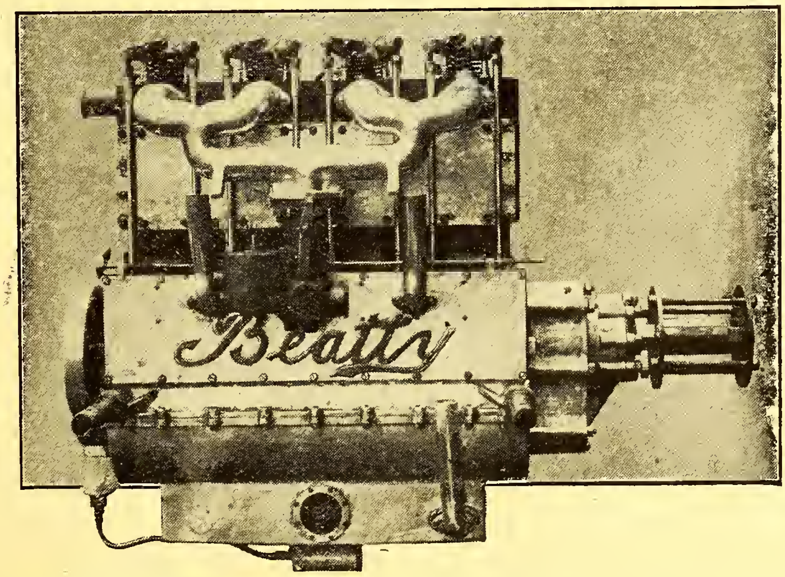

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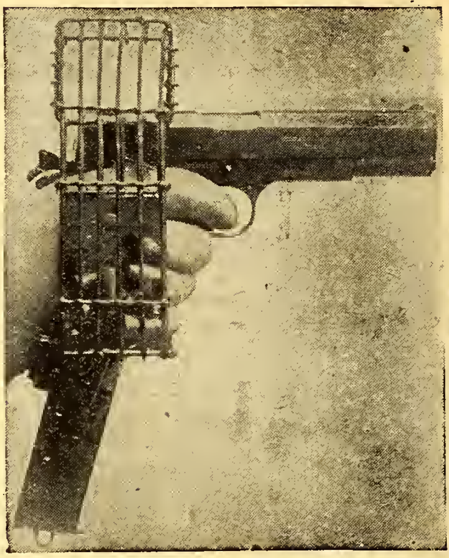

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ON THE EDUCATION OF ENGINE MECHANICS.

Some few weeks ago, in the course of a note on the training of mechanics, the following sentences appeared in this page: "The system of training mechanics in the R.F.C. before handing them over as the finished article to Service Squadrons is believed to be excellent. So far as one can learn, it is less excellent in the R.N.A.S., where it seems to have been the practice to send a newly enlisted mechanic to any station which is short of hands, and leave him there to pick up what knowledge he can from whatever engines may be in use at that station."

Taken absolutely literally, that statement was true, in that such was the practice in the R.N.A.S. some time ago, and, as far as one had the opportunity of learning at the time when the sentence was written, it might have been true only shortly before. As one grows older one grows wiser, in some ways anyhow. At any rate, one's knowledge increases.

In this particular matter very considerable increase of knowledge has been vouchsafed, and one desires to withdraw, contradict, and apologise for any suggestion that the training of R.N.A.S. engine mechanics is less excellent in any man than is the training of R.F.C. engine mechanics. As to the respective methods of training carpenters, riggers, and aeroplane mechanics generally, it is impossible to give an opinion, for, though one knows something of the R.F.C. methods, those of the R.N.A.S. are "wropped in mystery" as yet.

However, the reference in the notes quoted was distinctly to engine mechanics, so it may be well to indicate how thorough is the training of R.N.A.S. ratings (E.), which stands for engineering.

THE SPREAD OF KNOWLEDGE.

Bearing strictly in mind the while the necessity for not giving away information of value to the enemy, it seems well, also, that all concerned with aeronautics should know something of what is being done. How this knowledge was acquired by the present writer does not matter. "No names, no pack-drill," is an excellent proverb. And the men who do the quiet, unobtrusive, but most valuable work of the Services mislike advertisement. As Mr. Kipling sang of his own masters:

> *"Bless and praise we famous men—*
> *Men of little showing—*
> *For their work continueth*
> *And their work continueth,*
> *Broad and deep continueth,*
> *Great beyond their knowing."*

"Famous" does not imply the infamous fame of the newspaper, and "little showing" in public means the greater showing of work done. One can, however, say that whatever is set down in evidence hereafter is not gossip and hearsay.

Officers who have been long on active service far from home, and who have had in the past the task of teaching their own mechanics and junior officers the very elements of internal combustion engines, will doubtless be glad to know that the engine mechanic of the new generation is a different being from the type which came into the Service in the early days. One recalls an officer from a coast-defence station, not so very, very many months ago, who lamented that an A/M. who had been sent to his station as an engine-fitter turned out to have been employed in fitting sparking plugs to engines in a factory where engines came out like sausages. And it was probably the same officer who found that an A/M. delivered to him as a sheet-metal worker had been employed in punching out the tops of tobacco tins on a power press. Such things simply cannot happen under the existing system.

Secondly, the manufacturer to whom the reputation of his engines for efficiency is even dearer than his own personal reputation for sobriety, honesty, or any other virtue—as should be the view of the true artist—may be glad to know that the new generation of R.N.A.S. engine mechanic knows as much about his particular engine as do the best of his own mechanics, for the good and sufficient reason that, if he does not know his job, he is not passed out as an engine mechanic.

Thirdly, the civilian mechanic who wishes to join the R.N.A.S. may be the better for knowing that if he is a good enough workman to do the class of work required under the present system, and if he has the brains to become a first-class engine hand, he can always depend on getting a well-paid job when he leaves the Service, for any aero-engine or motor-car works will jump at the chance of getting him.

Fourthly, R.N.A.S. mechanics who are already in the Service, who are in earnest about their work, and who do not regard it merely as a pleasing alternative to trench warfare, should know of the opportunities offered them of improving their knowledge, and of thus acquiring the means of bettering their positions in life, either in or out of the Service.

And, fifthly, if the studious German who is charged with collating all possible knowledge obtainable *via* neutral countries from enemy aeronautical papers, and transmitting it to the High Command of the Hun flying services, does happen to come across these notes, it probably will not console him to obtain additional evidence that in some respects some sections of some of our Services are being organised with super-German thoroughness.

TRADE TESTS.

One must not, of course, indicate precisely the routine of training under the existing system, but one may safely say that, when a mechanic joins up, he is required to state the class of work in which he professes to be competent, and that he is tested in that work. For example, if he professes to be a fitter, he is required to demonstrate the fact that he can file flat and file square.

It might be objected that no one ever does have to file flats and squares in these days of milling and planing and shaping and pressing machines. Very true, so far as factories at home are concerned, and probably true, also, where well-equipped seaplane-carriers and coast-defence stations are concerned. But one does not imagine that the R.N.A.S. detachments in East Africa or Mesopotamia include in their impedimenta the latest products of Alfred Herbert or the E. W. Bliss Company.

Therefore, if a man demonstrates that given a piece of round iron bar he can produce from it with a file alone a one-inch cube which will pass well and truly through an accurately made inch-square hole in a plate, presenting any side of the cube to the hole, such a man may be assumed to know something of his job, and is likely to be more useful as an engine mechanic than the most expert setter-up of machine-tool work.

The Sense of Tests.

An engine mechanic may never be required to file inch cubes from round bar, but if he can do it he proves that he can make a decent job of any ordinary piece of fitting, as for example repairing a badly worn dog-clutch, such as occurs in starting handles, magneto drives, gears on transport cars, and so forth, where a good fit means prolonged wear, and where slack and knock in the first fitting means doing the job all over again soon after.

That cube test is a fair test of pure workmanship, but would-be R.N.A.S. mechanics need not run away with the idea that the trick—for it is a trick—is enough to pass them in. There are other tests which, though easier as pure hand work, call for more mental ingenuity, for men are judged for intelligence as much as for manual skill.

In similar ways copper-smiths, electricians, acetylene welders, brazers, and so forth are given tests which prove at once their skill and intelligence. One is forced to admire, at times, the nerve of men who submit themselves for examination. When a man who poses as a welder turns out a test job which has crinkles in it like a badly fried pancake, one at least respects his faith in the ability of pure joss to get him through. But he does not get through, which may be some consolation to flying officers and observers whose lives depend at times on the soundness of a welded repair job.

Higher Education.

If a man satisfies those in authority as to his knowledge of his job and his general mental ability, he then starts in to learn what there is to learn about engines. Rotaries, Radials, Vees, and Verticals, air-cooled and water-cooled, are taken down, disembowelled, and the parts taken to pieces, down to the most minute item. Then they are put back again, and the engine is run.

The men have to make notes of all they see in the process, and they are examined afterwards as to their knowledge.

The engines on which the men operate are not condemned and obsolete wrecks, but of the latest types, British, French, and German, so that whenever a man leaves the training school he has the latest knowledge available at the moment. For which reason, instead of going to an air station or an active-service squadron to learn his job, he is probably a valuable acquisition to his new C.O., because his knowledge may well be more modern than that of the men who have perhaps been handling for months engines of an old type still in service, though about to be superseded when the newer engines are available in quantities.

In any case, the man straight from the school knows at least as much as anyone at his new station, except perhaps that that particular station may have one of those star-turn mechanics whom one meets occasionally who have discovered some trick of their own of tuning up one particular type of engine so that in their hands it gives more power than anyone else can get out of it.

The daring of those in authority at the school will be appreciated by mere trade mechanics when one states, in properly awed tones, that they actually venture to break the sacred seals on certain engines and let their pupils take those same engines to pieces, though none in the Aircraft Industry would have the temerity to alter so much as the curve of an oil pipe, even if it might mean redesigning a whole fuselage to accommodate that same pipe in its normal state.

Theory and Book Work.

Apart from practical work with the engines themselves, the men have lectures and demonstrations with sectionised parts and models, on the theory of internal combustion engines, magnetos, and such fearsome subjects. Due consideration is given to the fact that a first-class mechanic is not necessarily a good man at book work, so that the consequent examinations are of an essentially practical kind. What the Service needs is a combination of hand and head, and not a mere *competition-wallah,* and the school sees that it turns out what the Service wants.

Apropos which lectures it pleases the present writer to contemplate the idea of so much useful war work being done in one of the very lecture-halls where something like twenty-five years ago he himself worked, and it is to be feared slumbered, for many hours of each week. That, however, by the way.

The point is that the system of training mechanics for the R.N.A.S., as at present in full operation, would be very hard to beat. A man who gets through with top marks is a very good man indeed, and unless a man is a thoroughly sound mechanic he does not get through at all.

Refresher and Special Courses.

One gathers, also, that there is a scheme by which men from air stations may return at times to the school for "refresher" courses of instruction in the latest engines or methods. Also, certain selected men from the school and certain men from air stations are given special facilities for visiting the works of certain aero-engine manufacturers, and remaining there long enough to acquire extra knowledge of the design and methods of production of those engines, so that they may become specialists in the particular make which they have chosen.

NOTICE TO READERS.

In view of the difficulties of the paper situation the Proprietors of THE AEROPLANE, in agreement with their contemporaries, have decided to raise the price to THREEPENCE. This change will take effect with the next issue, dated April 4.

Existing subscriptions will not be affected, but new subscriptions and renewals will be increased to correspond with the new price.

In this way it becomes possible to send a specialist in one particular engine out to a station or a squadron which is being equipped with such engines, and to be sure that those engines will give the best possible results. The extension of the scheme suggests that in future we shall hear to a less degree that certain of our aeroplanes have "failed to return."

A LENDING LIBRARY.

In that same article in THE AEROPLANE which was quoted at the beginning of these notes it was remarked that letters frequently come to this office from mechanics on active service, asking where they can obtain details and drawings of engines of various types.

It is satisfactory to note that it is now possible for R.N.A.S. mechanics to obtain all the information which they may require on these matters. The R.N.A.S. Engine School has actually in its possession descriptive booklets concerning practically every engine at present in service.

In many instances these booklets have been compiled by the manufacturers of the engines themselves, and are beautifully produced and illustrated. In all cases the information is clearly and lucidly set forth, so that anyone who understands that general type of engine can readily grasp the details of the particular type.

Naturally such booklets cannot be sent round broadcast, firstly because it is not desired that they should reach the enemy, and secondly because of the difficulties of the paper and printing trades. But those books can be had for the asking by any officer commanding an R.N.A.S. unit, and he can lend them to his men.

The wise C.O. will make a special point of encouraging his engine hands to ask for such information, and he will see that his men get it. And if, as has happened on occasion, the C.O. is too busy, or does not take sufficient interest in his men, to study their mental welfare, or if, not being a regular flier himself, he does not appreciate the value of educating his men in the latest engine practice, the junior officers, flight-commanders, and so forth, who are in very close touch with their men, will do well to worry the C.O. for the information which is so readily available.

It will, one believes, be welcome information for many R.N.A.S. ratings abroad to know that by the simple process of applying to their immediate commanding officer they may keep themselves thoroughly up to date in the latest engine design and practice.

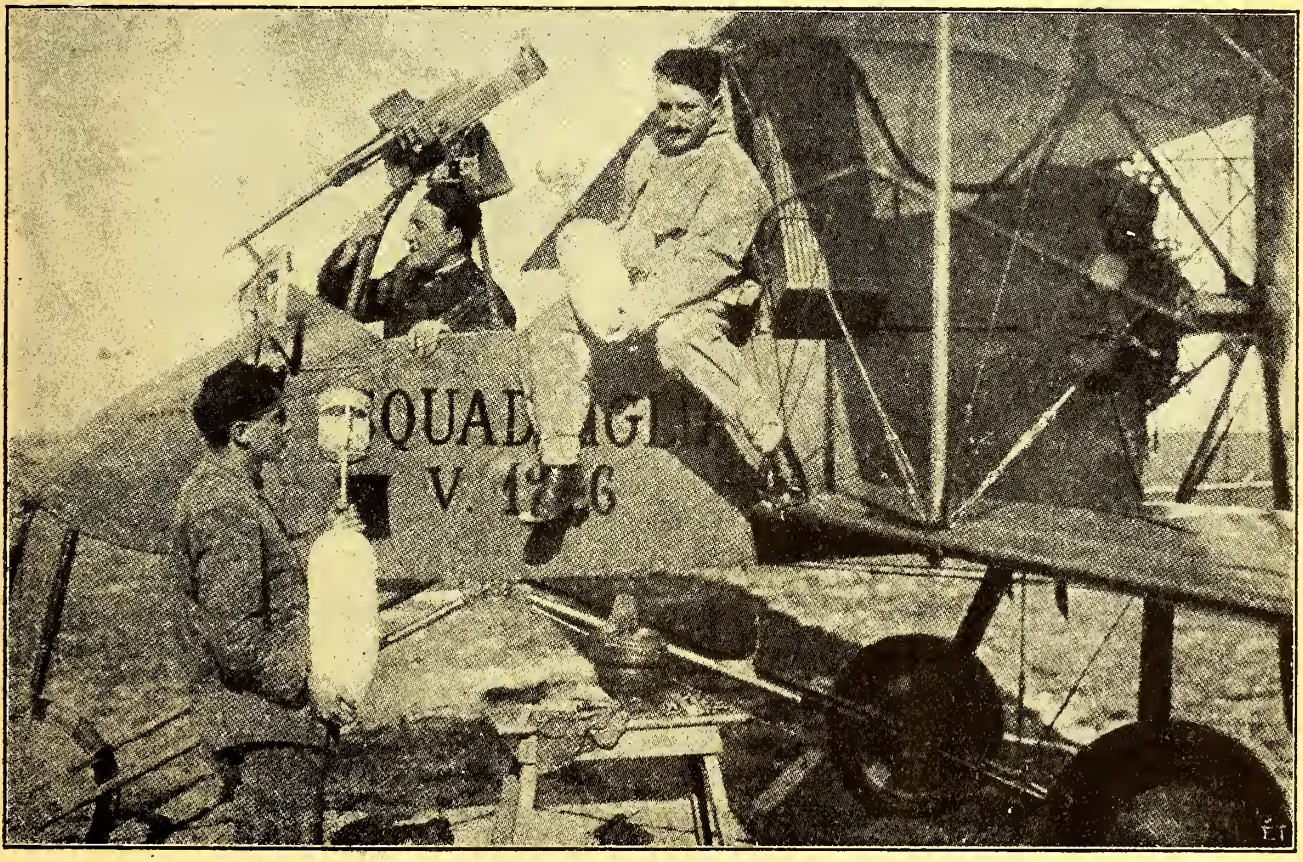
EXCHANGE OF EXPERIENCES.

So far as booklets describing the anatomy of various engines are concerned, much knowledge of very great value may be thus obtained by intelligent and ambitious mechanics, but the education of a surgeon does not stop at anatomy. The engine mechanic, in the nature of his occupation, is more in the nature of an operating surgeon than a pure anatomist, and just as the successful surgeon must have a knowledge of physics and psychology so must the highest class of engine mechanic know as much as possible of the manners and customs of the various engines with which he may have to deal, as well as the behaviour of hydro-carbon fuels in the processes of carburation, the action and reaction of various oils as lubricants, and so forth.

Such matters as carburation, lubrication, ignition, and other kindred matters affecting the running of engines may be studied in books, to some extent; but the school of experience is, in such affairs, the best in the world. Life is too short for any man to learn from his own experience all that there is to learn about every engine, therefore the best form of schooling is the exchange of experiences.

STEPS IN THE RIGHT DIRECTION.

In time of peace such matters would be discussed openly and freely in this paper, for exchange of experiences between users is one of the chief functions of a



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An Italian S.I.T.-Voisin biplane with Salmson engine. The machine-gun mounting is of interest, as also is the bomb, which is being handed up by a mechanic.

technical journal, but obviously in war-time one is altogether barred from discussing anything which might assist the enemy in improving his own technical matériel.

It is therefore the more necessary that those in authority should take steps to assure that exchange of experiences which is so highly necessary for mechanics and pilots alike in both Services. For this reason it is the more gratifying to know that such steps are being taken.

Probably it is inadvisable to make known in print just how this is being done, but probably most officers commanding Naval Air Stations know all about it, and, if junior officers do not know, they are recommended to inquire from their seniors. Similarly, mechanics who are really keen on their work are recommended to inquire from their immediate commanding officers.

The result should be many discussions of absorbing interest to engineer officers and mechanics at home and abroad, and both officers and men who find out for themselves hints and tips as to improvements in the design or running of engines should have a fair chance of benefitting the Service and of obtaining credit for themselves by exchanging their experiences with those of other stations and with headquarters.

The system of exchange reflects high credit on those responsible for it, and one hopes that every possible encouragement will be given to mechanics by officers commanding stations to assist in the exchange of experiences and to extend therefrom the excellent education which they are now receiving at the Engine School itself.

One reads glowing accounts in the daily Press of the prowess of our aviators of both Services, and of our vast preparations at home for building and equipping a huge air fleet, but so far one has heard nothing of the training and education of the men on whose competence the successful working of that air fleet depends. "Honour where honour is due" still holds good, so let that be the excuse for dragging into the limelight a department of the King's Service whose modesty at least equals its efficiency.—C. G. G.

A MATTER FOR THE AIR BOARD.

There has been a great deal of discussion of late among those closely connected with the design and production of aeroplanes concerning a mishap which recently occurred to a new aeroplane on test, and I venture to suggest that the Air Board would do well to investigate the affair very closely.

It appears that a machine of new French design, but of outstanding and approved merit, was built to pattern in this country by a firm of high standing, whose work has always been of the best quality. While on test, the fabric of one wing burst and stripped off, and, but for the unusual coolness and skill of the pilot, there would have been another of those inexplicable smashes which have cost so many lives since flying first began. However, the machine was brought down safely, and the cause of the stripping of the fabric was made clear.

Unless my information is altogether at fault, the trouble was caused by an alteration of the French design for the structure of the wings, which alteration was made under instructions from an official design department. It may be assumed that the French method of construction was evolved as the result of proper tests and of practical experience, and, therefore, no amateur aeroplane designer should have been permitted to tamper with it.

It is obviously fortunate that the accident occurred when and how it did, for if the material of this machine had held up during the test doubtless many other wings would have been built to the same altered design, with consequent waste of labour and material when the defect was discovered. And quite possibly the defect would not have been discovered till several lives had been lost on active service through the wings giving way after they had become fatigued by use, for they might have stood up well enough while new.

In any case, strict investigation should be made by the Air Board into the circumstances under which the alteration was made, and the person who ordered the alteration should be so placed in future that he can do no further damage by disimproving the designs of those who possess greater experience. If the department of the Air Board which is concerned with the control of aircraft construction has not already had its attention drawn to this incident, further particulars may be had on application to this office.

Meantime I wish to state that I have not received any information on this matter from those immediately concerned with the accident. I do not even know the makers of the machine by sight, and I heard the details some time before I next saw the pilot—with whom, incidentally, I have not discussed the affair. Therefore the particular officials at fault will be well advised not to visit my sins on the wrong people.—C. G. G.

TRAINING.—IX.

BY "BERKELEY."

It is opportune at this stage to treat of retirements. There is in war no more important phase in operations than that of retreat. In all campaigns on land it is the fate of one or other of the armies in the field to retrace its steps either in the following of a definite plan or at the enforced behest of a victorious enemy. The present war has seen several. Some will enter into the more brilliant pages of history; on some will fall the obscurity of shame. But from all backward movements, no less than from the advance of victory, there are many lessons to be learnt by those to whom experience is to be a ready guide in days to come.

In the manner of war now prevailing on most fronts of the present war a degree of inelasticity prevails which is contrary to all rules propounded for the seemly conduct of hostilities. It is a method entirely antagonistic to the principles laid down by the German strategists of the past centuries, whose work has exercised a prevailing influence in recent wars. Swift movement, decisive action, and hard fighting are the factors in which they laid the greatest stress. The war of attrition in which the prolonged siege was the commonest operation was to them a vision of horror in which the result was a manner of universal exhaustion in which the relative position of the nations engaged did not vary at any stage of the campaign. The results attained would be entirely unsatisfactory.

But in parallel warfare such as obtained on the Western front until the beginning of the German move which now appears to be drawing to a close, and which came into being in the beginning in order to gain time for a consolidation of strength and the elimination of preliminary confusion consequent on the vast and swift movements of the early days of the struggle, it is not easy to revert to open warfare with a relative freedom of manœuvre, as neither opponent wishes to take the great attendant risk.

Retirement for Freedom.

It became clearly impossible for either combatant to break through the opposing lines, even at heavy loss,

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and, therefore, the only course open was for one or other army to retire, in order to restore freedom of movement. If freedom of manœuvre was not the desired aim, then a shortening of the line by a retirement on strength was also of value, and it is possible that the present operations are for such a purpose.

There is no part of war in which such difficulties are present as attend the carrying out of a retreat. Psychologically it has an evil effect on the retiring troops, and even those in whose hands lie the direction of operations and whose plans have dictated the movement are not free from the depression of surrendering, even with a view of future success, the land that has been hardly gained in the earlier days of the campaign. The fact that such a move will encourage the enemy, even though he, too, realises the true intent, does not give any pleasure.

DIFFICULTIES OF RETREAT.

The actual fighting is under greater difficulties. The movement is in a contrary direction to that in which it is necessary to fight. A constant speed of retirement must be made, else the rearguard will either be left in the air or will overtake the columns in retreat in such manner that confusion and disorganisation brings about defeat. The supply of ammunition and the movement of wounded are both infinitely less simple than under reversed conditions.

The preparations for retirement are long and exhaustive. The value of the ground surrendered must be reduced as much as is possible that the advancing enemy may find no æsthetic joy in the regained territory. All that is of use or importance must be moved in good time, yet not too soon, to the new line of defence. The railways must vanish as the troops fall back. The bridges must cease to be. The road of the enemy must of necessity be made unpleasant And yet all these things must be prepared in secrecy, that counter-preparations may not be made in time to be effectual.

AEROPLANE COVER.

Thus an extensive aeroplane offensive may coincide with the preparations for retreat. In parallel warfare the aerial scout alone is able to bring any considerable amount of information as to enemy dispositions, and it is therefore of high importance that his activities shall be absorbed in other directions in these times of crisis. He must be prevented from crossing the lines in so far as it is possible. If he succeeds in penetrating the veil, then it is necessary to prevent his return if means are available. The introduction of newly designed and more highly efficient aeroplanes in the theatre of war may be opportune at such a time, as the problems thus set the enemy air service may be sufficiently difficult of solution to prevent successful curiosity on his part until too late.

It is not possible for an army, of whatever degree of skill it may be possessed, to conceal entirely its preparations for retirement. The elimination or destruction of railways, the gradual reduction in number and in size of ammunition dumps, the removal of batteries of artillery, the retirement of the bigger guns, the clearing of all unnecessary transport from the immediate paths of retreat are all partially visible to the trained and skilled observer. That which he does not specifically see will affect him mentally by the mere variation of vision from the experience of previous flights. He will by a sort of intuition realise the imminence of change, though he cannot gauge its character, nor can he understand the process of thought that has brought him to such suspicion of immediate futurity. Nevertheless, his attention is held, and he will inevitably begin the discovery of signs and indications that mark the development of enemy plans.

DISCOVERING NEW DEFENCES.

Provided the opposition of the aviators attached to the army that intends retirement is insufficient to prevent a degree of aerial reconnaissance, those aeroplanes engaged on routine strategic scouting will be able to discover the line on which the enemy proposes to retire. The construction of redoubts, the serried lines of trenches, and careful construction of gun emplacements reveal the new extended fortress to which the enemy will retreat. The discovery of this line and its state of preparedness will at the same time indicate the approximate date of the proposed movement. Herein lies another point in the vast importance of aircraft in the wars of to-day and the future.

This manner of retirement is in itself an admission of temporary defeat. It indicates the inadequacy of the enemy forces to hold all that which they have taken and at the same time execute vigorous plans at other points. It reveals the partial failure of the initial offensive and the relinquishment of the greater for the lesser objective. If successfully carried out, it is a certain warning of greater efforts in another part of the theatre of war. As it is a concentration, it is at the same time a menace. But at the best it is but a symbol of an overreaching ambition or of a miscalculation of time. Delay in the success of the initial blow gives the unready time in which to prepare.

THE MOMENT FOR ATTACK.

There is one space of time during a retirement in which the enemy, if he is aware of the movement and has held the information for a sufficient period to admit of the necessary preparations, may strike with great effect, and, other things being equal, with a reasonable chance of success. That space begins at the opening of the retreat, and ends when the movement is in orderly progression. During this period there is undue tension on the nerves of those about to retreat, and a brooding sense of possible catastrophe is ever present. For a moment cohesion appears to be lost, and it is not until the pace is constant and the time-table in successful operation that security begins to reassure the depressed troops. The vital blow should be struck before the depression begins to lift. An orderly retreat, attacked at the opportune moment, will often develop into an uncontrollable rout, which may not end until after the fall of the heavily defended line to which retirement was intended. Thus conclusive victory may come as a result of information gained from those whose duty is the continuous practice of aerial reconnaissance.

THE EFFECT OF IMPETUOSITY.

Another form of retirement from conditions of parallel warfare is that when it is desired to obtain freedom of manœuvre, and depends for its success on the impetuosity of the enemy. The conditions are very different, for it is not necessary in this case, if confidence can be given to the plan of operations, to prepare an elaborate position on which to retire. But a retreat of this nature would be valueless if the enemy failed to respond. It would not be possible to divert troops for duties in other fields, lest in the result the enemy did in fact advance, and yet, if the opponent remained stationary, the retirement would be of but little use. It must not be forgotten, however, that no enemy worthy of his salt and possessed of a realisation of military propriety would fail to put his "fortune to the touch" of open battle.

On the other hand, an over-impetuous enemy, nourished in the memories of a brilliant past, may

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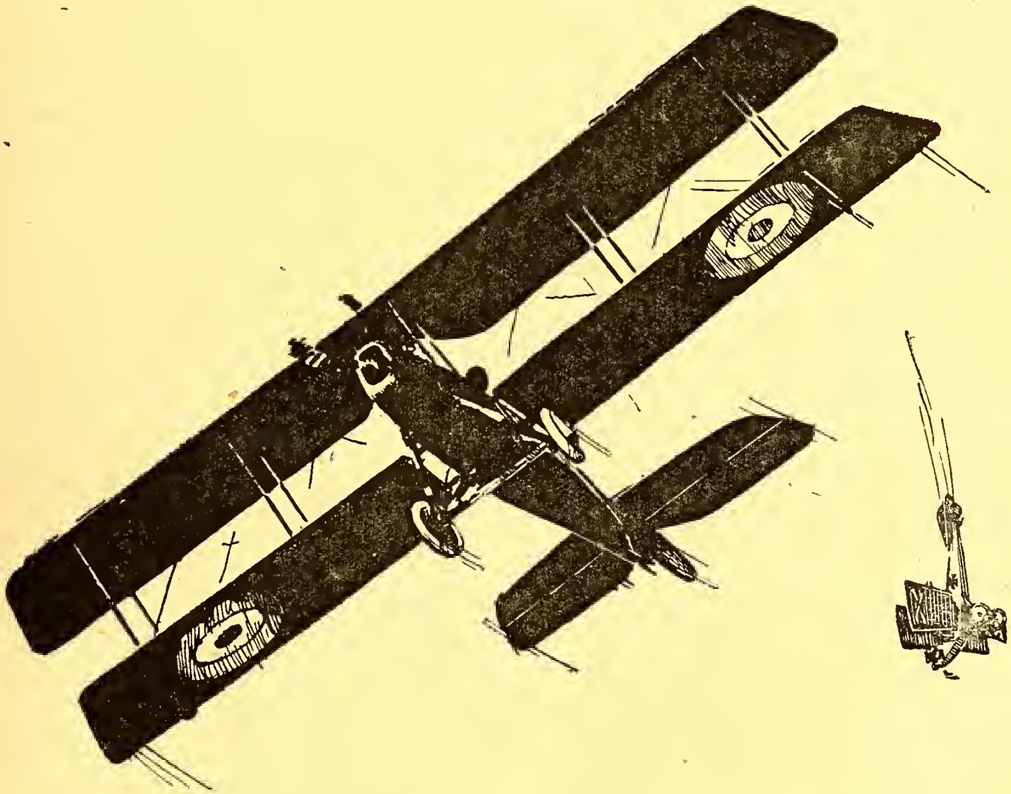

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desert caution and follow a retreating opponent with vigour untempered with discretion. The trap, unbaited but tempting, encloses the advancing troops, the enemy retirement ceases, and destructive battle is joined. The advancing army, which for a space imagined itself to be the pursuer, is cornered in a salient, from which extrication is necessary before further action is possible. The losses thus caused are probably heavy, and disaster may follow. Here, again, the information brought by aeroplanes is, in a sense, a deciding factor. The depth and consistency of the retirement can be indicated with some clearness of expression, both from reconnaissance reports and from the photographs taken systematically and in large numbers day by day. The area prepared for retreat will be obvious in its extent, and will indicate by its formation much of the intentions of the retreating forces.

There is also the form of retreat which is designed to keep the enemy occupied in following, and to divert him from other occupations more perilous to other portions of the armies in the field. Sir John Moore in the retreat to Corunna retained the full attention of the French, and relieved the pressure on the Spaniards and the English farther south. Too weak to risk a general engagement, he was important enough to be driven out of the country, or to be followed in the hopes of annihilation before he could embark in British transports, if, indeed, any were available. His determination and skill reaped its due reward, and his name is historic for all futurity.

More than a century later a British Expeditionary Force, sent overseas in much the same manner, had, after gaining contact with the primary foe in the newer war, to make a long and dangerous retirement, which, in view of the spirit of the personnel engaged and the generalship displayed, was, it is said, successful in its results. The attention of the German Army was held while in other places counter-attacks were prepared. The speed of the retreat had also the effect of extending the German lines of communication so swiftly and over such a distance that they became dangerously slender. The enemy overreached himself.

AIRCRAFT IN THE LORDS.

On March 22nd **Lord Balfour of Burleigh** asked whether it was the case that heavy motor-lorries belonging to the Royal Naval Air Service had been sent from Hendon to Liverpool Street Station to convey quite small parcels, and whether the regulations in force for the lorry service and all other cars using petrol in the Air Service can be laid on the table of the House.

The Earl of Lytton replied that the Admiralty had no knowledge of the circumstances described in the question. The misuse of petrol was to be discouraged and deplored. The regulations in force were very stringent, and these regulations were watched with great care by the Committee. He assured Lord Balfour that if he would give him any information tending to the discovery of any infringement of the regulations the matter would immediately be investigated by the Committee and the necessary steps taken to put it right. If the noble lord thought that any useful purpose would be served by placing those regulations upon the table of the House he was quite willing to do it.

Lord Balfour expressed the hope that the regulations would be placed on the table.

AIRCRAFT IN THE COMMONS.

On March 20th **Mr. Pemberton-Billing** asked the Under Secretary of State for War whether he is prepared to consider the standardisation of some type of bomb-dropping machine that they may be produced in a sufficient quantity to undertake a sustained offensive behind the enemy's lines?

The Parliamentary Secretary to the Air Board (Major Baird): The possibility of such standardisation as the hon. Member suggests is being kept in mind. But the production of various types of aeroplanes must be governed by the requirements of the Naval and Military Services.

Mr. Billing asked the Under Secretary of State for War whether the machines known as B.E.2 C, B.E.2 E, and B.E.2 D are now being used for offensive work or for bomb-dropping behind the German lines; and, if so, what is the average speed and climb of these machines?

Major Baird: The answer to the first part of the question is in the negative; the second part, therefore, does not arise.

Mr. Billing: Am I to understand that these machines are not being employed over the lines?

Major Baird: That was not the question the hon. Member put down.

Mr. Pringle: "For offensive work," yes.

Mr. Billing: Are these machines going over the lines for offensive work? It is a perfectly straightforward question.

Major Baird: It would not be in the public interest to state what kind of machines are used.

Mr. Billing: Does the hon. and gallant gentleman appreciate that it would be in the interests of the pilots?

Major Baird: I certainly appreciate that, but the hon. Member must recollect that any answer given here is at once sent over to Germany, and it does not suit us, in the interests of the pilots or of anybody else, that the Germans should have this information.

ROYAL AIRCRAFT FACTORY.

Mr. Billing asked the Under Secretary of State for War whether Lieutenant-Colonel O'Gorman is still in control of the Royal Aircraft Factory; and, if not, for what reasons was he removed from his post?

Major Baird: Lieutenant-Colonel O'Gorman ceased to be superintendent of the Royal Aircraft Factory upon his appointment as consulting engineer to the Director-General of Military Aeronautics.

Mr. Billing: May I ask whether the hon. and gallant gentleman is aware that it is the custom of the Director-General of Military Aeronautics constantly to send Lieutenant-Colonel O'Gorman to the Factory and use his influence?

Major Baird: That is altogether contrary to the facts. The Director-General of Military Aeronautics makes the best possible use of Colonel O'Gorman.

OBSERVER'S DEATH.

Mr. Billing asked the Under Secretary of State for War whether his attention has been drawn to the particulars in connection with the death of C. J. Jarvis, an aeronautical observer in the Royal Flying Corps; and will he say what type of machine he was in at the time, and to what cause is his death attributable?

Mr. Macpherson: This officer was in a B.E.2 D at the time of his death. I have no details of the casualty, which took place as long ago as Oct. 26th, 1916.

THE —— —— SCOUT.

Mr. Billing asked the Under Secretary of State for War whether the order for the —— —— scout has been altered or cancelled; and, if it has been cancelled, will he say when this machine was offered to the authorities; when the order was placed; what number was ordered, and what deliveries have taken place, and if this order has been cancelled, for what reason?

Major Baird: Parts 2, 3, and 5 of his question are repetitions of a question addressed to me by the hon Member on the 12th instant. I regret that I can add nothing to the reply which I then gave him. It would be contrary to the public interest to furnish the remainder of the information asked for.

Mr. Billing: May I ask whether it is not in the public interest or in the interests of this House that contracts of this description, which are unfortunate, should be discussed or debated?

Major Baird: No. The interests of the House and of the public, I take it, are the same as the interests of the nation, and at this particular moment it is very undesirable that we should give the Germans information which would enable them to know how long it takes us to produce new machines.

Mr. Billing: Is the hon. Member not aware that this machine was offered by this firm twelve months ago this month, and that it took eight months for the authorities to make up their minds what they were going to do about it?

Major Baird: On a point of order, Mr. Speaker. I have just invited the attention of the hon. gentleman to the point that it is not desirable to give information to Germany as to the time which it takes us to get machines out, and he has just stated precisely the thing that I have said it is not in the public interest to state.

Mr. Billing: I should like to point out, Mr. Speaker, that the information I asked for was not how long it took for us to turn it out, but how long it took our authorities to make up their minds?

Mr. Speaker: That is one disadvantage of asking questions without putting them down on the Paper.

AEROPLANE CONSTRUCTION.

Mr. Billing asked the Prime Minister whether he will take steps to provide for the appointment of one technical head for both the naval and military branches of aeroplane construction; and whether he will see that powers are given him to control the design and requirements of machines for both of these Services?

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The Chancellor of the Exchequer (Mr. Bonar Law): I see no reason for disturbing the present arrangement, which was only recently arrived at after the fullest consideration, whereby the control of the design of aeroplanes and seaplanes to be ordered for both Services is vested in the Air Board, on which both Services and the Ministry of Munitions are represented.

Mr. Billing: Is the right hon. gentleman aware that this administration has been responsible for some 500 or 600 machines —at present brand new machines—being deposited in all the available places around? Is he aware that I spent the morning going round to these depots and inspecting them?

Mr. Bonar Law: I am certainly not aware of the last part of the question, and I have no reason to believe the accuracy of the first.

COMMITTEE OF MEMBERS.

Mr. Billing asked the Prime Minister whether, in view of the present state of our Air Services, he is prepared to consider the appointment of a Committee of Members of this House privately to inquire into and report upon the general administration of our Air Services?

Mr. Bonar Law: I am not prepared to accept the suggestion contained in the question.

Mr. Billing: Is the right hon. gentleman prepared to take some steps to inquire into the present administration and the present conditions of affairs in the Department?

Mr. Bonar Law: The subject has been most minutely investigated by the Cabinet, and we are satisfied that everything is being done that can be done at the moment.

Mr. Watt: Was it not on the question of the Air Service that the last Government went out, and has this Government been any improvement?

Mr. Bonar Law. I think the hon. gentleman is confusing this Government with that of France.

On March 21st the following written answers were given :—

Mr. Billing asked the Parliamentary Secretary to the Air Board whether General Sir Douglas Haig has expressed his dissatisfaction, either directly or indirectly, with certain types of machines which are being employed in France; whether the B.E.2 E, B.E.2 C, or B.E.2 D machine is still being ordered; and, if so, in what quantities?

Major Baird: The answer to the first part of the question is in the negative; but I would refer the hon. Member to the statement of the Field-Marshal's views contained in the dispatch from him which was published on Dec. 29th last. As regards the second and third parts of the question, it would be contrary to public interests to give information as to the types and numbers of aeroplanes being ordered. The hon. Member may rest assured that no machines are being ordered for employment in France which the Commander-in-Chief does not want.

Mr. Billing asked what proportion of British Government-designed machines are at present being employed in France and what proportion of private British-designed; what proportion of French-designed; and what proportion of accidents coming under the heading of killed, wounded, or missing are to be attributed to each of these types, respectively, in the last twelve months?

Major Baird: It would not be in the public interest to give the information asked for in the first and second part of the hon. Member's question. The compilation of the figures asked for in the third part of the question would involve a very considerable amount of work, and as it would not furnish the material for a fair comparison, I do not think that the War Office could justifiably be asked to undertake it at the present time of pressure.

R.N.A.S. (TOOLS ALLOWANCE).

General Ivor Philipps asked the Secretary to the Admiralty whether A.M.[C] ratings in the Royal Naval Air Service are required to find their own tools at an initial cost of £13 10s.; whether he is aware that the Admiralty allowance of 3d. per day for the use of these tools in the service of the State is insufficient to cover the cost of the wear and tear of such tools and provides no funds to pay for the use of the tools in the service of the State or to pay for loss and breakage; and whether he will consider the desirability of providing Government tools or increasing the daily allowance so as to prevent loss falling on the men?

Dr. Macnamara: The circumstances in which these ratings have been required to find their own tools were explained in my answer to my hon. friend the Member for the Westhoughton Division on Feb. 21st. These ratings are generally enlisted from artisans who would already possess most of the tools contained in the list recently drawn up by the Admiralty; therefore an expenditure of only a few shillings would be necessary in most cases to bring the man's kit up to the Admiralty requirements. Facilities are afforded to purchase tools at Government rates, which are considerably below those at present ruling in the retail market. Used Government tools may also be purchased to complete the kit at four-fifths of the Government rate for new tools. The 3d. per day allowed for upkeep of tools amounts, roughly, to £4 10s. per annum—sufficient to provide a new kit of tools every three years. The allowance should, therefore, amply cover depreciation and breakages. Practically all the tools included in the standard equipment are necessary to the fully qualified carpenter in civil employment—certainly none could be considered as useless on the man's return to civil life. It is, however, intended to issue a revised list of tools which will bring the cost of the full kit considerably below £13 10s.

AEROPLANES (SALE).

On March 22nd **Mr. Billing** asked the Parliamentary Representative to the Air Board whether he is aware that new aeroplanes are being offered by the administrators of the Royal Flying Corps for sale by private tender; whether any civilian has access to inspect these machines; what is the total number of machines which are being so offered; what types of machines are being so offered; and what is the reason of their being so offered?

Major Baird, in a written answer, said :—Certain aeroplanes are now being offered for sale by private tender. Opportunity for inspection is limited to representatives of schools instructing intending applicants for services approved by the War Office. The total number of machines is eighty-nine, composed of Bleriots, Caudron and Short biplanes, Morane monoplanes, and twin Curtiss; of these, thirty-six have been used. The reasons for disposal are, in the great majority of cases, that the engines which suit these aeroplanes can be better employed in other types.

[Are there no B.Es or R.Es. besides those mentioned?—Ed.]

MR. C. BRIGHT'S RECOMMENDATIONS.

Mr. Billing asked the Under-Secretary of State for War whether the chairman of the Air Board has had the opportunity of reading the recommendations of Mr. Charles Bright contained in the Air Committee's Report on the administration and command of the Royal Flying Corps; whether he has availed himself of this opportunity; if so, whether he has adopted any of the suggestions contained therein; and whether he has called in the assistance of Mr. Charles Bright to elaborate any recommendations he made in that Report?

Major Baird, in a written answer, said :—My noble friend has had the advantage of acquainting himself with the recommendations referred to. The recent changes in the organisation of design and supply of aircraft for the Naval and Military Services to a great extent coincide with some of those recommendations, and it is possible that future action will be taken which will be in accordance with others. Mr. Bright's recommendations are very clearly stated in the Report, and the need for their elaboration has not arisen.

On March 26th **Col. J. Craig** (Down, E., U.), replying for **Maj. Baird** (Rugby, U.) to **Capt. Bennett-Goldney** (Canterbury, U.), who asked whether the recommendations of the judicial Parliamentary air inquiry, presided over by Mr. Justice Bailhache, had been carried into effect; whether any of the aeroplanes in which our aviators were sent up to fly at night were still of the same type, if not actually the same machines, as those which had been condemned in France as unsuitable for the purpose owing to their liability to engine troubles; whether any of the aeroplanes now used for night flying in Great Britain were of the type known amongst aviators as "dud" machines or machines with Royal Aircraft Factory engines with — cylinders such as had been condemned in France; and whether any of these machines and engines were still in use in France, said :—The answer to the first part of the question is that the two major recommendations of the three contained in the main report have been substantially adopted. The answer to the second part is in the negative, to the third and fourth parts that it is not understood to which type of aeroplane the hon. Member refers; but as regards the engine which he mentions that he is incorrect in stating that it has been condemned in France. This type of engine is now in use in France and elsewhere, and the reports upon it are satisfactory.

THE REASON WHY.

The "Daily Express" says :—

> A statement made by Major Baird, representing the Air Board, in the House of Commons on March 20th, emphasises the fact that German agents are still active in this country. In refusing to supply Mr. Pemberton-Billing with certain information about the supply of aeroplanes, he said :—
>
> "Any answer we give in this House is at once sent to Germany."
>
> Printed and written information can always be stopped by the censor. The question remains: How is the information conveyed?

[The probability is that it is not conveyed to Germany, at any rate soon enough to be of any real use, but the possibility of information being of use to the enemy makes an excellent excuse for refusing to give information which would be of service to the British Empire, in that it would expose the incapacity of those who have been in control of aircraft supplies in the past.—Ed.]

THE ROYAL FLYING CORPS HOSPITAL.

The committee of the Royal Flying Corps Hospital have received from Lady Tredegar (to whose generosity they owe the use of her house, No. 37, Bryanston Square) a cheque for £375 in respect of the maintenance for a period of six months of "The Lady Tredegar Ward," and one additional bed in the hospital.

Learn to Fly for £100.

A want has long been felt in this country for a Flying School which would give pupils a complete course of instruction in Flying, not merely sufficient practice in the handling of a machine to enable them to pass the Royal Aero Club test in the shortest possible time, but a clearly defined course in Flying Theory and Practice, including a series of lectures, etc., as well as flying instruction on modern tractor (Government type) dual control biplanes.

To fill this want a School is being organised which will be known as

The Oval School of Flying.

It will be established on an estate near London, with a commodious house and every accommodation for residential purposes, and the fee charged will include board and residence on the premises during the whole of the course.

The proposed fee will be £150 (inclusive), but in order to get our first class together for the opening of the School on April 16th, 1917,

WE ARE PREPARED TO TAKE OUR FIRST TWELVE PUPILS AT £100 EACH.

Further details can be obtained on application to—

The Secretary,
THE OVAL SCHOOL OF FLYING
166 PICCADILLY, LONDON, W.1.
Telephone: Vic. 8183.

NAVAL AND MILITARY AERONAUTICS.

From the "London Gazette," Tuesday, March 20th, 1917.

Admiralty, March 15th.

March 17th.—Temp. Flt. Lt. H. H. Square, who relinquishes his commn. on account of ill-health contracted in the Service, to retain his rank.

R.N.A.S.—Flt. Lt. P. E. H. Wakeley, who relinquishes his commn. on account of ill-health contracted in the Service, to retain his rank.

War Office, March 20th.

REGULAR FORCES—Establishments.—R.F.C.—Mil. Wing.—Flying Officers.—Temp. Sec. Lt. (on prob.) A. B. Coupal, Gen. List, Dec. 2nd, 1916. Lt. (temp. Capt.) G. A. R. Spain, Ind. Army, from a Flying Officer (Observer), Feb. 16th, seny. from Dec. 1st, 1915. Sec. Lt. (on prob.) (temp. Lt.) G. Leckie, R.G.A., Spec. Res., from a Flying Officer (Observer), seny. from Feb. 21st, 1916. Sec. Lt. I. Gregory, R.F.A., T.F., and to be secd.; Sec. Lt. E. W. Hallam, Yeo., T.F., and to be secd., Feb. 23rd. Temp. Sec. Lt. (on prob.) R. Littlejohn, Gen. List, Feb. 25th. Temp. Sec. Lt. (on prob.) F. C. Parkes, R.E., Spec. Res.; Sec. Lt. (on prob.) G. W. Armstrong, Spec. Res.; Temp. Sec. Lt. (on prob.) G. E. Brookes, Gen. List, Feb. 27th. Lt. A. W. B. Miller, K.O.S.B., and to be secd.; Lt. S. W. Williams, Essex R., T.F., from Mach. Gun Corps, and to remain secd.; Sec. Lt. H. Tennant, Dns., and to be secd.; Sec. Lt. B. Scott-Foxwell, Yeo., T.F., and to be secd.; Sec. Lt. (temp. Lt.) D. Y. Hay, R. W. Kent R., T.F., and to be secd.; temp. Lt. H. M. Ferreira, Tng. Res. Bn., and to be transfd. to Gen. List; temp. Sec. Lt. G. C. Heseltine, Gen. List, from a Flying Officer (Observer), seny. from July 15th, 1916. Sec. Lt. J. A. Pullan, Durh. L.I., Spec. Res.; Sec. Lt. (on prob.) C. R. Sloan, Spec. Res.; temp. Sec. Lt. (temp. Lt.) H. Hamer, Gen. List, from a Flying Officer (Observer), Feb. 14th, seny. from April 1st, 1916. Lt. F. R. G. Milton, M.C., R.A., from a Flying Officer (Observer), Feb. 23rd, seny. from April 18th, 1916. Sec. Lt. A. R. James, Yeo., T.F., and to be secd., Feb. 23rd. Sec. Lt. W. Roger, Arg. and Suth. Highrs., T.F., and to be secd., Feb. 27th. Temp. Lt. A. V. Quinnell, L'pool R., from temp. Capt. Servn. Bn.; Sec. Lt. F. A. V. Cook, Durh. L.I., T.F., and to be secd.; temp. Sec. Lt. C. W. Langlands, Gen. List, Feb. 28th.

Flying Officers (Observers).—Temp. Sec. Lt. J. G. Coombe, Linc. R., and to be transfd. to Gen. List, Nov. 15th, 1916, seny. from May 14th, 1916. Temp. Sec. Lt. L. Nevile-Smith, Gen. List, seny. from Oct. 15th, 1916. Lt. R Mayberry, R. Sc. Fus., Spec. Res., and to be secd., seny. from Nov. 5th, 1916. Temp. Lt. E. D. Jones, A. Cyclist Corps, and to be transfd. to Gen. List, Feb. 22nd, seny. from Nov. 23rd, 1916. Feb. 22nd, seny. from Nov. 25th, 1916:—Sec. Lt. (temp. Lt.) H. Q. Nickalls, Yeo., T.F., from Brig. Sig. Troop, Yeo., T.F.; temp. Sec. Lt. M. A. S. Vaile, North'n R., and to be transfd. to Gen. List; temp. Sec. Lt. A. J. E. Etches, attd. E. York R., and to be transfd. to Gen. List; temp. Sec. Lt. (on prob.) J. Fleming, Gen. List, Feb. 21st. Sec. Lt. G. W. B. Hampton, Suff. R., T.F., and to be secd., seny. from Dec. 4th, 1916. Temp. Sec. Lt. B. S. Lister, N. Staff. R., and to be transfd. to Gen List, seny. from Dec. 22nd, 1916. Sec. Lt. F. H. L. Varcoe, M.C., Midd'x R., T.F., from attd. Glouc. R., T.F., and to be secd., seny. from Dec. 26th, 1916. Sec. Lt. W. O. Hatcher, Sco. Rif., and to be secd., seny. from Dec. 28th, 1916. Lt. (actg. Capt.) J. W. Rayner, North'd Fus., Spec. Res., and to relinquish his actg. rank, seny. from Jan. 18th. Sec. Lt. (temp. Capt.) B. E. Sutton, M.C., Yeo., T.F., from Adjt., Sept. 27th, 1916, seny. from Feb. 2nd, 1916, Feb. 22nd. The seny. of temp. Sec. Lt. H. J. Bennett, Gen. List, is Jan. 14th, and not as stated in "Gazette" of March 7th.

Balloon Officers.—Temp. Sec. Lt. H. G. Kirk, Glouc. R., and to be transfd. to Gen. List, Nov. 21st, 1916, seny. from July 31st, 1916. Temp. Lt. S. Wright, M.C., R.E., Jan. 2nd., seny. from July 5th, 1916.

Equipment Officer, 1st Cl.—Appt. of Lt. (temp. Capt.) R. K. Pillers, North'd R., Spec. Res., notified in "Gazette" of Feb. 21st, is antedated to Dec. 6th, 1916.

Memoranda.—To be temp. Sec. Lt.:—Sergt. J. Bennett, from R.F.C., for duty with R.F.C., Feb. 23rd.

To be temp. Sec. Lt. (on prob.):—D. R. Morford, for duty with R.F.C., March 9th.

SPECIAL RESERVE OF OFFICERS.—Reserve Units.—Infantry.—Bedf. R.—The following is secd.:—Lt. G. R. Taylor, for duty with R.F.C., Jan. 28th.

Supplementary to Regular Corps.—R.F.C.—Military Wing.—Sec. Lt. L. M. McCoy resigns his commn., March 21st.

To be Sec. Lts. (on prob.):—A. W. Judge, March 7th. H. P. Beasley, March 8th. C. F. Gorringe, C. E. Wykes, March 9th. V. M. Adamson, C. E. Amoore, A. R. B. Gill, W. Brackenbury, T. Campbell, A. Chapple, J. E. Dawes, F. J. Farlow, R. J. Fetherston, L. E. Heather, R. B. Hutchings, P. H. Harbutt, C. B. Hudson, D. H. Kemp, D. Low, I. Massey, D. G. Moreton, E. A. Masters, A. C. Nixon, T. A. Peddell, W. Searle, R. J. Shanks, J. W. Tattersall, F. Walters, March 10th.

TERRITORIAL FORCE.—R.E.—Sec. Lt. (temp. Capt.) N. M. Halcombe to be secd. for duty with the R.F.C., Dec. 16th, 1916.

Infantry.—Lancs Fus.—Sec. Lt. B. E. Edwards is secd. for duty with R.F.C., March 3rd.

E. Lancs R.—Sec. Lt. A. J. J. O'Farrell to be secd. for duty with the R.F.C., Feb. 10th.

Hamps. R.—Sec Lt. W. B. Wood to be secd. for duty with the R.F.C., March 3rd.

Yorks. L.I.—Sec. Lt. A. H. Margoliouth is secd. for duty with R.F.C., Feb. 18th.

Midd'x. R.—Lt. J. W. Sanders is secd. for duty with R.F.C., Sept. 15th, 1916.

Wilts. R.—Sec. Lt. J. E. Bottomley is secd. for duty with the R.F.C., Jan. 25th.

* * *

Scottish Office, Whitehall, March 16th.

The King has been pleased, by Warrant under His Majesty's Royal Sign Manual, bearing date the 15th inst., to direct a Commission to be passed under the Seal appointed to be kept and made use of in place of the Great Seal of Scotland, appointing John George, Duke of Atholl, to be His Majesty's Lieutenant of the County of Perth, in the room of John James Hugh Henry.

* * *

From the "London Gazette" Supplement, March 21st, 1917.

War Office, March 21st.

REGULAR FORCES—Establishments.—R.F.C.—Mil. Wing.—Special Appointments.—(Graded as a Sqdn. Comdr.)—Capt. G. H. Cox, N. Staff. R., Spec. Res., a Flt. Comdr., and to be temp. Maj. whilst so employed, March 1st. (Graded as a Flt. Comdr.).—Lt. G. MacD. Turner, York R., T.F., a Flying Officer, and to be temp. Capt. whilst so employed, March 1st.

Flt. Comdrs.—From Flying Officers, and to be temp. Capts. whilst so employed:—Sec. Lt. F. N. Hudson, M.C., E. Kent R.; Sec. Lt. R. C. M. Smith, Spec. Res., March 4th. Temp. Lt. J. K. Summers, Gen. List, March 8th. From Flying Officers:—Capt. L. S. Platt, Lrs., March 6th. Temp. Sec. Lt. (temp. Lt.) J. B. Graham, Gen. List, and to be temp. Capt. whilst so employed, March 11th.

Flying Officers.—Sec. Lt. J. B. McCudden, Gen. List, Jan. 1st. Sec. Lt. (on prob.) G. Davis, R.F.A., T.F., and to be secd., Feb. 23rd. Temp. Sec. Lt. F. M. Green, Gen. List, from attd. R.E., Feb. 25th. Temp. Capt. V. F. Davies, A.S.C., and to be transfd. to Gen. List, Feb. 26th. Sec. Lt. (temp. Capt.) L. C. Coates, Lond. R., T.F., and to be secd.; Lt. D. S. Weld, Canadian Gen. List; Sec. Lt. C. S. Ramsay, R.E., T.F., and to be secd., Feb. 27th. Temp. Sec. Lt. W. M. B. Skinner, attd. Bedf. R., and to be transfd. to Gen. List; temp. Sec. Lt. J. S. Black, Gen. List, Feb. 28th. Sec. Lt. (temp. Lt.) A. D. Pryor, Camb. R., T.F., and to be secd.; Sec. Lt. (temp. Lt.) O. D. Maxted, E. Kent R., T.F., and to be secd.; temp. Sec. Lt. W. Durrand, Gen. List; Sec. Lt. D. Stross, R.F.A., T.F., and to be secd.; Sec. Lt. (on prob.) G. H. Boorne, Gen. List, March 1st. Sec. Lt. W. Laidler, R.F.C., T.F., and to be secd., March 8th.

Balloon Co. Comdr. (graded as a Flt. Comdr.).—Sec. Lt. (on prob.) (temp. Lt.) E. L. B. Buchanan, R.F.A., Spec. Res., from a Balloon Comdr. (Graded as a Balloon Officer, and to be temp. Capt. whilst so employed, Feb. 26th.

Equipment Officers, 2nd Cl.—Capt. L. S. Metford, Spec. Res., from a Flt. Comdr., March 7th. 3rd Cl.—Temp. Sec. Lt. G. H. Heys, attd. Manch. R., and to be transfd. to Gen. List, Dec. 7th, 1916. Sec. Lt. J. E. Bottomley, Wilts R., T.F., and to be secd. Jan. 25th. Temp. Lt. D. O'B. Gill, R.E., Jan. 28th. Sec. Lt. (on prob.) S. V. Green, Spec. Res., Feb. 8th. Temp. Sec. Lt. (on prob.) G. Carr, R.A., and to be transfd. to Gen. List, Feb. 18th. Sec. Lt. H. P. Reid, Spec. Res., from a Flying Officer, March 6th. The appt. of temp. Sec. Lt. G. H. Wilson, Gen. List, notified in "Gazette" of Feb. 2nd, is cancelled; the rank of Sec. Lt. E. W. Lawrence, Gen. List, is as now described, and not as in "Gazette" of March 3rd.

Schools of Military Aeronautics.—Asst. Instr.—Graded as an Equipment Officer, 2nd Cl.—Sec. Lt. G. A. Hilliar, Glouc. R., an Equipment Officer, 3rd Cl., and to be temp. Lt. whilst so employed, March 6th.

Royal Regiment of Artillery.—R.H. and R.F.A., Sec. Lt. relinquishes the actg. rank of Capt.:—W. R. A. McGee, on ceasing to comd. an Anti-Aircraft Batt., Nov. 27th, 1916.

Memoranda.—To be temp. Lt.—Sub-Lt. W. T. Gilson, from R.N.V.R., for duty with R.F.C., Jan. 6th, with seny. from Oct. 29th, 1916.

To be temp. Lt.:—Sub-Lt. L. M. Goodyear, from R.N. Div., for duty with R.F.C., March 1st.

To be temp. Sec. Lts.:—A. E. Reynolds, for duty with R.F.C., Jan. 26th. Actg. Cpl. A. J. Evans, R.F.C., on Gen. List, for duty with R.F.C., March 9th.

R. J. H. F. Beresford to be temp. Sec. Lt. (on prob.), for duty with R.F.C., March 9th.

(Continued on page 810.)

THE BRITISH & COLONIAL AEROPLANE CO., LIMITED

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The British Aircraft Industry.

BY CHARLES L. FREESTON.

(Founder Member of the Royal Aero Club.)

IX.—MARTINSYDE, LIMITED.

So limited is the number of actual pioneers in British aircraft construction that it is scarcely to be wondered at that for the most part they worked alone in the earlier stages of their troublous careers. In the case of "Martinside, Limited," however, we have an interesting example of a loyal and uninterrupted co-operation between two early enthusiasts, Mr. Helmuth Paul Martin and Mr. George Handasyde, who have worked shoulder to shoulder from the days when aeroplane constructors could be counted on the fingers of one hand.

It is possibly because two heads are proverbially better than one that they have come through their long career as designers with a minimum record of mistakes.

Mr. H. P. Martin.

Mr. G. Handasyde.

Mr. Hamilton Fulton.

MARTINSYDE QUALITY.

Now, in wartime itself, their machines, which are doing service at the front, are known by their sound workmanship and lasting qualities. They are not of the kind which put up a fast performance under test and then tail off into inefficiency, as an air-cooled engine in the early days of motoring used to peg out at the first long hill. On the contrary, they do their work steadily on active service, and are just as taut and sound after months of use as they were when they were put to their first flight.

THE BEGINNING OF THE PARTNERSHIP.

The genesis of the partnership may be recounted in a few words. In the year 1908, Mr. H. P. Martin was "running" the Trier and Martin carburettor. Into his office one day came Mr. Handasyde, who was also a carburettor specialist. They joined forces there and then in this particular line.

Soon afterwards there came to hand the news of Wilbur Wright's first acknowledged achievements. With an enterprise worthy of all praise, they decided to build an aeroplane for themselves, and promptly acquired, as the first requisite, a 10-12 h.p. Humber engine.

Thereby they may be said to have anticipated the view to which many of the ablest designers in the aircraft industry have now come round after long experience—namely, that to produce a successful aeroplane you must choose your engine and then build the machine round it.

TUNING UP.

The Humber engine was "tuned up," until it gave something like 22 h.p., and, incidentally, one may remark that getting extraordinary power out of engines has always been one of the specialities of the partners. Then the pair of jovial experimentalists proceeded to surround that Humber engine with an aeroplane of their own design.

THE MONOPLANE FAITH.

It was a monoplane, and no one familiar with aircraft history needs to be reminded that, in this respect, Messrs. Martin and Handasyde kept their colours nailed to the mast right up to the war period.

Since then they have conformed to the requirements of the time, and built successful biplanes, but they are prepared to argue in favour of the monoplane just as strenuously as ever.

THE FIRST WORKSHOP.

It was not under a railway arch, for a wonder, that building operations were begun in this instance; the dancing-hall at the Welsh Harp, Hendon, was selected, and it will be news to the newer generation of aviators that the now famous village thus early became associated with the construction of aircraft.

Incidentally, it may be mentioned that whenever dancing was in progress the machine in embryo had to be hoisted up to the roof, so as to offer no obstruction to the tripping of the light fantastic toe on the floor beneath.

FIRST ATTEMPTS.

At length the machine was finished. It had a 22 ft. span, with a chord of 5 ft. to 6 ft. at the root, and 3 ft. at the tip, and weighed only 580 lb. A hill was chosen at Edgware from which to make the first attempts at flight. Our pair of pioneers did the usual rushing about from field to field, hoping for hops, and ever keenly scrutinising the wheel-marks to see if, perchance, the machine had actually left the ground.

Naturally, they had their fill of mechanical troubles. Though the machine would not rise, the engine itself flew right out one day, owing to the vibration set up by the breaking of one of the blades of the metal propeller. If they had had a robuster engine, Mr. Martin avers, they would have done something satisfactory with the machine.

However, they rebuilt the engine after its "stunt" on its own account, and soon afterwards smashed up the aeroplane itself. Then they decided to move their quarters to Barking Creek, where Mr. Handley Page had already commenced operations.

More Railway Mishaps.

Having succeeded at length in getting off the ground more or less, Messrs. Martin and Handasyde came to a sudden and most remarkable decision—"absolutely mad," as they retrospectively regard it. An aviation meeting was projected at Halifax, and they decided to compete thereat.

The machine had been rebuilt, of course, but they were still using the same engine, not having the wherewithal to buy a better. On the way to Halifax the aeroplane was smashed up in the railway, much as happened to Mr. Roe, as related recently.

Yorkshire Optimism.

Imagine the feelings of the undaunted pair, on arriving at length in Halifax, to find that theirs was the only aeroplane on the scene, and smashed into the bargain, and that the promoters of the meeting had widely advertised that the machine would fly over the town, descend at the "Zoo," and then fly back again. Our heroes spent a doleful week in rebuilding the machine, crowds of angry people, meanwhile, gathering round, and more than once being nearly on the point of wrecking the tent.

At length, the machine was got ready—and an 80 miles an hour gale sprang up and blew the tent and aeroplane to smithereens! The engine and whatever bits of the machine could be gathered up were all packed into a single box for the return journey.

Three-ply Faith.

Work was then resumed at Hendon, where the first all three-ply fuselage machine was built, with a 32 ft. span, and about 6 ft. chord at the roots, and 4 ft. at the tip. The partners have always believed in three-ply properly used, which is interesting in view of recent German developments. When the new machine was finished it was transferred to Brooklands, which had been visited by Paulhan, and the reversion of his shed was secured.

Increasing Power.

The original 10-12 h.p. engine was still being used—*faute de mieux*—and was run until it burst, whereupon it was replaced by a 40 h.p. J.A.P. Thoughts of serious flying were now entertained, and, indeed, realised; but the machine, none the less, came to an untimely end.

It was fitted with the Antoinette system of control, and Mr. Martin started off for a flight with the elevator-wheel one turn wrong, and could not get it round while flying. He tasted the unenviable experience, accordingly, of flying along with no means of getting down except by switching off, and he came down "on a dead pancake" of about 60 ft. Fortunately, he was unhurt, but the machine, of course, was smashed.

Mr. Gilmour's Advent.

It was rebuilt, and then Mr. Graham Gilmour arrived on the scene, and expressed a desire to fly it in the de Forest competition. The same trouble was experienced, however, as that to which reference has already been made in the article on Mr. A. V. Roe's experiences; the J.A.P. engine of that period could not be used for ten minutes at the outside without smothering the pilot in oil. Nobody had tried the effect of a cowl up to then, but when one was fitted to the machine in question, a new trouble arose; the engine would not keep cool.

The First Big Machine.

A larger machine was then designed and built, and was exhibited at the second Olympia Show in 1910, with a 50 h.p. Gnôme engine. It was flown by Mr. O. C. Morison (now Lieut., R.N.V.R.), and also by Mr. Gustav Hamel. Originally, it was intended for Mr. T. O. M. Sopwith, but was not ready in time for his visit to America.

The machine was larger than its predecessors, and had a 36 ft. to 38 ft. span; as a matter of fact, even with the 50 h.p. Gnôme, it was underpowered.

The Coming of the Antoinette Engine.

M. Latham came over to England, however, and expressed much admiration for the design. He procured a 65 h.p. Antoinette engine of the latest type, with petrol injected through the inlet-valves, high tension magneto and steam condensers—a very different thing, in fact, from the one which let him down twice in succession in the Channel.

Experience showed that the new engine was first-rate, and Mr. Martin declares that it was the most reliable and satisfactory aircraft motor that was ever built, before or since. Indeed, he went on using Antoinettes indefinitely, and never had a single mechanical breakdown with any one of them. Yet no one else would look at them, because of the bad name which had been earned by those fitted to the machine in which Latham had come to grief, and by others which were handled by incompetent mechanics in various countries.

Increasing Output.

Aided by the new engine the Martinsyde machine now quickly secured a reputation for practical qualities, and quite a number of them were built, the firm having, meanwhile, taken over a second shed at Brooklands.

As illustrating the high opinion which was held of the type at the time, I may recall the fact that after poor Graham Gilmour had been killed on a Martinsyde, I happened to be discussing the tragic event with a friend who was not only one of the most skilful pilots of the day, but was himself a "rival" constructor at Brooklands. Quite spontaneously, he remarked that the accident could not possibly have been the fault of the machine, which he declared to be as safe as anything that was built; and it will be remembered by those familiar with the period that the accident was attributed to purely physical causes, Mr. Gilmour having been overtaken with sudden illness.

A Record Journey.

Less widely known, perhaps, are the circumstances attending the remarkable performance, which ended so unhappily, by Mr. Edward Petre, known as "Petre the Painter," in December, 1911.

He left Brooklands on Christmas Eve with a ten hours' petrol supply on board, intending to fly to Edinburgh. He had covered no less than 250 miles, which was then the longest cross-country flight that had ever been made, and had actually averaged 80 miles an hour, when the gale which was blowing at the time caught him sideways and blew him out towards the sea. He fought desperately for a quarter of an hour to effect a landing, and, finally, from *force majeur*, came down in an impossible field between the water and the hills. The fatal termination to this journey quite obscured the wonderful character of the performance itself.

Military Trials.

Another machine was built for the next Olympia Show, and was fitted with an 80 h.p. Dansette-Gillet engine. It was then entered for the Military Trials, a 90 h.p. Chenu motor having, meanwhile, been installed, as the Dansette-Gillet proved unsatisfactory.

It may be remembered that the weather during the trials was tempestuous, and the lot of the aviators, both above and on the ground—in unlined sheds without any flooring—was not particularly enviable. The 90 h.p. Martinsyde, piloted by Mr. Gordon Bell—later Major, R.F.C.—flew in the highest wind, and was the only machine that went up in the presence of the Parliamentary Commission. It also climbed very well, but the engine was hopeless, and disintegrated frequently, earning for itself the nickname of the "Chez Nous," owing to its fondness for staying at home.

Among pilots who flew the new Martinsydes about this time were Mr. Gordon England and Mr. T. O. M. Sopwith. A good deal was also done during that year in the way of passenger flights.

The Austro-Daimler Machine.

At the 1913 Olympia Show a monoplane was staged without an engine, but before the close a 6-cylinder Austro-Daimler stationary motor of 120 h.p. was acquired, which proved to be an invaluable acquisition.

It was used for the whole of that year uninterruptedly, and ran 600 hours without ever being touched in the way of repair. Mr. Harold Barnwell flew the machine to which it was fitted in the Aerial Derby, coming in second by three seconds only to Mr. Hamel.

The Trans-Atlantic Martinsyde.

After the Aerial Derby, Mr. Hamel approached the firm with a view to the building of a special machine—for the trans-Atlantic flight to wit. He had received an offer from Mr. Mackay Edgar, the wealthy Canadian, to finance the flight, and the preparations for it, provided that he (Hamel) would make the effort, and that he could find a firm who would build a suitable machine.

The proposal was accepted with enthusiasm by Messrs. Martin and Handasyde, who set to work forthwith; they were given, indeed, only three months in which to design and produce the machine. Still faithful to their old love, they built a big monoplane, with 62 ft. 4 in. span, and a 14 ft. to 9 ft. chord. It had an aluminium petrol tank, holding 336 gallons of fuel, and was calculated to average 90 miles per hour over 20 hours' flight, with a 300 h.p. Austro-Daimler engine.

A special shed was put up for its erection and housing, and Mr. Mackay Edgar arranged for the chartering of a ship, and with the Newfoundland station for cable work. Mr. W. E. de B. Whittaker was sent by Mr. Edgar to Newfoundland to make arrangements for a starting place and supplies.

When the machine was all but completed, however, and only awaited the engine, Gustav Hamel was lost in the Channel. Shortly after Mr. Mackay Edgar showed no further interest in the project, and Captain Robin Duff, who had conducted the negotiations for him, was killed in the war.

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Faith in the Possibility.

It is worthy of placing on record here that Mr. Martin and Mr. Handasyde are firmly convinced of three things:—(1) That the trans-Atlantic flight is feasible; (2) that it could have been accomplished with the machine above described; and (3) that it could only be achieved by a monoplane, without help of a following wind.

Their convictions as to these three headings are of the most precise kind, and, when the war is over, it will be more than a little interesting to see what eventuates in the way of trans-Atlantic attempts, and a possible Homeric contest between the advocates of the triplane, biplane, and monoplane respectively.

In Wartime.

To the firm's wartime developments, of course, only brief allusion is permissible. Just before the war broke out a Martinsyde was being demonstrated to the War Office by Mr. Waterfall and Captain Lawrence, but they were recalled on the opening of hostilities. The next thing that happened was that the War Office sent someone down to Shoreham to commandeer the engine.

Recognition at Last.

After this, the firm started to build their first scouts, purely as a speculation, and in view of the wall of prejudice against the monoplane they adopted the biplane form. The engine used was the 80 h.p. Gnôme.

The machines commended themselves to the War Office, and, without reference to any further types, it may be said that the firm has been engaged on Government work ever since. New sheds were erected at Brooklands, and in March, 1915, the Oriental Institute at Woking was also acquired as the nucleus of a rapidly expanding series of fine workshops. The name of the firm was changed to "Martinsyde, Limited," with Messrs. Martin and Handasyde as managing directors, and Mr. Hamilton Fulton as a member of the board and general manager.

Several of the employees of the firm in the early days now hold responsible positions on the staff, and Messrs. Martin and Handasyde attribute much of their success to their loyal co-operation and exceptional experience.

SOME AMERICAN CONSTRUCTIONAL DETAILS

The following details, which are reproduced with acknowledgments and thanks to the American "Aerial Age Weekly," are interesting examples of modern American aircraft practice.

The parts illustrated pertain to the H.3 Standard tractor biplane built by the Standard Aero Corporation of New Jersey, U.S.A.:—

All fittings of the Standard H.3 are of sheet metal, welded together, coated with enamel and baked. A few of the fittings are illustrated in the accompanying sketches.

(1) Foot Bar for the Rudder.—The bar itself is of walnut, supported on a lightened sheet steel block, and braced at the rear by a steel bar. A strip of sheet steel runs along the forward edge of the bar, held in place by countersunk wood screws. Each end is bent around the pin to which control wire is attached, lapped back upon itself and welded. A wood screw goes through the two thicknesses of metal. Stout leather straps for the foot grip are secured by round-head wood screws and copper washers.

(2) Internal Wing Construction.—The sketch shows fitting used in attaching the spruce compression member to the main wing spar, which also serves as a terminal for internal bracing wires. Fitting held to main spar by two bolts. A block is placed at either side of main spar at this point, with a veneer plate on top and bottom, all glued and tacked in place. Strut socket rests here, and the bolts that clamp around the wing spar are prevented by the blocks from slipping along the spar.

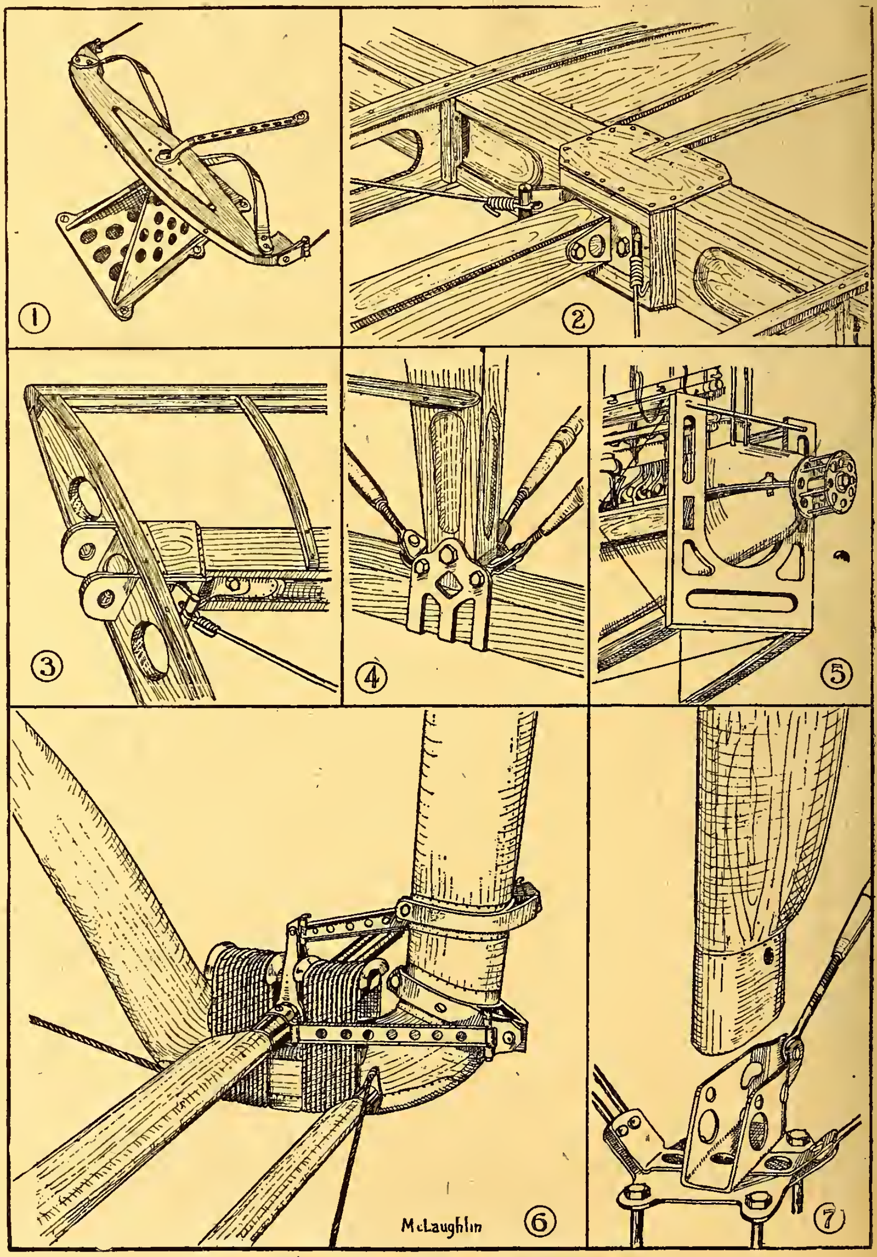
(3) Wing Attachment to Fuselage.—As the wings are swept back, ribs are at an angle to leading and trailing edges and wing spars. The fitting is composed of three principal parts, one at either side of spar projecting through the end rib, and a piece on the outside of rib which joins the other two, all welded into one fitting. Attachment to the spar is by two bolts.

(4) Fuselage Fitting.—Uprights and spacers in the fuselage are tapered and channelled. Fittings for their attachment to the longerons are of such a nature that similar fittings can be employed throughout, even though the longerons taper in section and the spacers vary in thickness toward the rear of the fuselage. The metal is cut away at points where its omission will not weaken the fitting.

(5) Engine Plate.—This plate is the forward terminal of longerons, and carries the forward end of the engine bed. It is of heavy gauge steel, with openings formed for lightness, the edges of which are turned in to secure rigidity. The upper portion of the plate is left open to make easy the installation and removal of motor, and a detachable steel bar is run across the top. In the finished machine the plate is covered in by a streamline nose.

(6) Shock Absorber.—The shock absorber works on a "pantagraph" principle. The axle, bound by suitable curved plates and rubber cord, is attached to the U chassis by two shackle bars, one placed above the other. Being bound this way, the axle must move upwards in a vertical path, instead of following the arc of the circle as when a single shackle is employed. By the direct vertical movement the strain on the rubbers is evenly distributed. Shackles are clamped to the forward part of the U members which are of laminated ash.

(7) Strut Sockets.—Strut ends are sheet bronze capped. A single bent pin holds the strut in place in the socket, which is easily removable. Socket in three parts, welded together.



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AIRSCREWS AT THE AERONAUTICAL SOCIETY.

The fifth meeting of the Aeronautical Society was held on Wednesday, March 21st, when Mr. M. A. S. Riach, of the Grahame-White Company, delivered an intensely interesting lecture on "Airscrews." The bulk of the lecture and the succeeding discussion was of such an extremely mathematical nature that it could scarcely appeal to the majority of the readers of even Aeronautical Engineering, as the following extract will demonstrate :—

The geometrical blade element aerofoil expression for the thrust is

$$N.\,dT_1 = N.\,cy_1.\,\rho.\,b.\,dx.\,4.\,\pi^2.\,n^2.\,x^2.\,\sec A_1.\,[1 - \tan A_1.\,\tan \gamma_1]$$

where (N) denotes the number of blades employed, and the momentum change expression on R. E. Froude's theory is

$$T = q.\,\rho.\,2.\,\pi.\,x.\,dx.\,V_1.\,(V + V_1).\,\left(1 + \frac{V_2}{V_1}\right) = \left(1 + \frac{V_2}{V_1}\right).\,q.\,\rho.\,2.\,\pi.\,x.\,dx.\,(2.\,\pi.\,n.\,x)^2.\,\tan A_1.\,[\tan A_1 - \tan A]$$

in terms of (A) and (A_1). So that, equating the two expressions, we obtain

$$cy_1 = \frac{q.\,2.\,\pi.\,x.\,\left(1 + \frac{V_2}{V_1}\right).\,\sin A_1.\,[\tan A_1 - \tan A]}{N.\,b.\,[1 - \tan A_1.\,\tan \gamma_1]}$$

which is the expression sought, and which when employed in conjunction with the wind channel graph of (cy_1) against (a_1) is sufficient to solve for both of these variables.

The two empirical unknown factors in the above equation are (q) and (V_2/V_1).

However, those who are sufficiently interested in the purely mathematical aspect of aero-dynamics can obtain full reports of the lecture in the "Aeronautical Journal," which is published quarterly by the Aeronautical Society. The audience, which was sufficient to fill the hall of the Society of Arts, followed the lecture with the greatest attention, and showed their appreciation thereafter.

The discussion was largely on similarly mathematical lines, and two of the contributors thereto discussed at such length that another member of the Society felt justified in expressing quite sincerely his pleasure at the privilege of hearing three such able lectures in one evening.

The following extracts are taken from the more easily understood portions of the paper :—

At the present time there does not appear to be any really adequate theory of the airscrew. The only theory that has been developed recently is the one given by Mr. F. W. Lanchester in a paper to the Institution of Automobile Engineers in April, 1915.* This paper is, moreover, admittedly based on certain theoretical conceptions, and not directly upon aerofoil data obtained from wind channel tests.

I have always believed in the possibility of successfully applying aerofoil data to propellers, and any method that attempted to co-ordinate the results of wind channel experiments on model aeroplane wings and on model airscrews appeared to me to be worthy of every encouragement.

It was for these reasons that the so-called blade element method of propeller analysis, in the first instance enunciated by S. Drzewiecki and later developed by Mr. F. W. Lanchester in his work, "Aerial Flight," appeared to me to be a step in the desired direction, and the few experiments carried out at the National Physical Laboratory to test the accuracy of the theory, and as published in the Report of 1912-13, led me to believe that the method might with advantage be developed analytically so as to form a reasonably sound basis for the comparison of experimental results, and to give to the designer a fairly clear outlook upon the subject.

It has always appeared to me that, when testing any theory, however empirical, a distinct advantage is obtained by first stating the whole of the premises, and, having got these clearly defined, to work out the results of the initial assumptions to their extreme logical conclusions. However approximate a theory may eventually turn out to be, it saves time in the long run to fully develop the theoretical aspect of the subject which is often capable of outlining new methods of attacking the problem even when the original conceptions upon which the theory was based have been shown to possess no longer a sufficient degree of exactitude.

As an example of this, I might quote the great importance of pitch-ratio upon efficiency in the design of airscrews, and it is difficult to see how such a conclusion could have been arrived at without the help of such analysis as that proposed.

As a consequence I was led to investigate the subject from the point of view of the blade element theory, and the results so obtained are given in my book "Airscrews."*

With the information now available upon the subject it has been found that this method is not sufficiently accurate even for the comparatively "rough and ready" methods of commercial propeller design, where the employment of empirical correction factors has been found to be necessary, and although it will probably be found that the theory is still quite a good guide, and, if employed in conjunction with the correct correction factors, may usually be trusted to give quite sufficiently accurate results for the ordinary "hack" propellers demanded of the designer in commercial design work, yet, viewed from the much more rigid standpoint of the degree of accuracy obtained in a laboratory experiment, it must be confessed that the method still leaves much to be desired.

A number here to-night will probably remember Mr. A. R. Low's paper on "Airscrews" read before the Society in April, 1913. In the discussion which followed the reading of this paper, Mr. Handley Page pointed out that Mr. Low had dealt with the propeller problem from the point of view of what happens to the air as it passes across the blade, considered on the assumption that the blade elements were entering undisturbed and non-accelerating air, and that in reality it did not by any means follow that the lift coefficients and lift-drag ratios taken for the section as tested as an aerofoil in a wind channel would be identical with the results obtained when the section formed part of an airscrew blade revolving in a helical path and encountering disturbed air, and that in consequence the coefficients would require modification to accord with practial results obtained.

This, Mr. Page went on to say, really constituted the second half of the problem, and dealt with the question from the point of view of the slip stream on the basis of the Rankine or Froude theory.

He expressed the opinion that there should be no antagonism between the two methods of design, but that they should rather be used in conjunction for the correct determination of all the constants of the propeller blade.

It was with a view of co-ordinating these two methods of attacking the problem that led me some time ago to consider whether an advance might not be obtained by utilising both of these theories in an attempt to take into account certain factors ignored in both methods considered separately, and by which the determination of some of the empirical constants used in practical design could be brought about, with the result of more closely co-ordinating theory and experiment.

Propellers as Aerofoils.

We may, I think, roughly divide a propeller blade into three parts, the boss, the tip, and the centre forming the main portion of the blade. It is usual, I believe, when designing propellers on the old aerofoil theory, to choose for the sections an average aspect ratio of, say, six, and then to employ a correction factor obtained by experiment in determining the blade widths along the blade. This process, however, seems to be open to objection from various sources. It is well known that the pressure distribution along the span of any aerofoil, such as an aeroplane wing, for instance, does not remain constant, but varies from a maximum intensity in the middle of the span to a minimum at the wing-tips, and it is this fact of tip losses which makes the high aspect ratio aerofoil more economical than one of lower aspect ratio.

The same consideration should apply to the blades of an airscrew, where each individual blade can be treated as a separate aerofoil, and where in consequence the end losses—in this case those of the boss and tip—must be taken into account in estimating the thrust, work, and efficiency.

The boss conditions in this case may probably be ignored as being very small; the tip losses form, however, a fundamental link in the chain of analysis, and in consequence require most careful consideration.

The exact analogy between the pressure distribution along the span of an aerofoil considered as an aeroplane wing, and considered as a blade of a screw propeller, does not appear to be immediately capable of demonstration. As a first estimate, however, I have assumed the maximum intensity of pressure to occur at about the centre of the blade, i.e., at a radius of $\frac{1}{4}$ diameter, and to fall off to a minimum value at the boss and tip—that is, I consider the propeller blade as the equivalent of an aeroplane wing of infinite span revolving about one of its wing tips.

[At a radius of $\frac{1}{4}$ diameter the blade would be just nicely blanketed by the cowl of the engine in a great many machines. —Ed.]

Under these assumptions, then, it is possible to form some idea of the relative changes in lift and lift/drag which occur as we proceed along the blade from the boss to the tip.

So that if, when analysing any existing airscrew, we apply the theory of inflow already enunciated under the conditions

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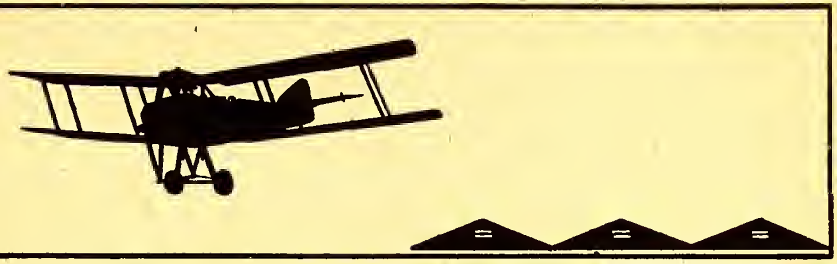
* "The Screw Propeller," by F. W. Lanchester. April, 1915, I.A.E.

* "Airscrews," by M. A. S. Riach. (London : Crosby, Lockwood and Son).



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imposed by the pressure distribution change considered above, we shall, I think, be in a position to form a fairly correct picture of the actual conditions under which the blades are working, and hence be in a position to estimate the probable values of the thrust, work, and efficiency, with a much larger measure of success than by the older method in which such refinements as those outlined here are ignored.

CONCLUSIONS.

In conclusion, the main points brought forward by the new theory, as an indication of possible directions in which enhanced efficiency may be expected to be found, appear to be as follows :—

(1) The importance of high aspect ratio, that is multiple blades.
(2) Good sections having high lift-drag values as aerofoils.
(3) Correct ($V/n.d$) values for maximum efficiency.
(4) Wide blades should only be employed in conjunction with the correct chord angles for best efficiency as given by the methods here outlined.
(5) There is still some uncertainty as to the correct amount of end tip loss to be allowed for, and further information regarding the (V_2/V_1) values will probably be found to be necessary.
(6) Multiple bladed airscrews should, if the foregoing theory is correct, require more B.H.P. to turn them than their two-bladed equivalents under similar conditions, but they should develop a greater thrust at the same forward and rotational speed, and their efficiency should be higher.
(7) Multiple blades raises the question of the requisite strength and consequent area of the sections from boss to tip, which cannot be decreased indefinitely without fear of bursting taking place. Advantage may, however, be taken of the fact that a very slight forward rake is usually sufficient to convert the whole stress into a pure tension, and, consequently, a much smaller section can then be employed. It should, however, be noted in passing that the centres of area of the blade sections along the blade should not in general lie on a straight line, but on a curve, the determination of which may be accomplished, as a rule, without much difficulty. All the sections will then be stressed in pure tension.

A GENTLE SUGGESTION.

[Incidentially, it does not appear that airscrew designers have paid very much attention to the fact that on many modern aeroplanes a propeller of between 8 and 9 ft. diameter is practically eliminated for the greater part of its diameter by being placed immediately in front of a cowl of something like 4 ft. diameter, and that in many cases there is actually a length of only about 2 ft. of blade at each end doing all the work.

It seems, therefore, almost as if something revolutionary might be done in the constructional design of propellers, apart altogether from the aerodynamic design, by combining the rotating cap, which is used on many machines, with detachable blades. It is a considerable time since Mr. A. V. Roe produced quite a satisfactory detachable blade, on lines which would save immense quantities of timber. This system might well be used in conjunction with some form of construction which would do away with the appalling waste of time, labour, and material which is involved in making a propeller of which something like half does no work whatever.

So far as purely theoretical airscrew design is concerned, apart from such practical matters as the construction of airscrews, and their intelligent use on various types of aeroplanes when constructed, those interested in the subject will find Mr. Riach's own book the best thing yet published, as apparently Mr. Lanchester's theories do not fit in with modern practice. At any rate, one has never heard of Mr. Lanchester's having designed a successful propeller which has flown an aeroplane, whereas Mr. Riach has frequently done so.

It is somewhat peculiar that though one hears so much about the Lanchester theory and the Drzewiecki theory, one never hears anything about the theories of people like M. Chauvière and Mr. Lang, who merely design and make propellers which seem capable of causing the particular machines for which they are intended to fly successfully. Probably they have the wisdom to keep the secrets of their design to themselves—Ed.]

THE WELLS FLYING SCHOOL.

Since the opening of the Wells School at Cobnor, Mr. Virgilio, the chief pilot, has been teaching pupils on 70-h.p. and 80-h.p. Gnomes. In spite of the unfavourable conditions he has been flying regularly with his pupils, so that they might have experience of flying in rough as well as calm weather. Each time he has been up with pupils they have flown at a height of from 3,000 ft. to 4,000 ft. and also across country.

The Officer Commanding an aerodrome some miles away paid a visit to the School recently and was taken up for a trial flight. He was very pleased with the work done and intimated his satisfaction at the way in which the work of the School was being conducted. Before leaving he gave permission for Mr. Virgilio to fly with his pupils from Cobnor to the aerodrome which he commanded, so that they might benefit by further experience of cross-country flying.

THE MODERN AEROPLANE.

On Thursday evening last Captain Barnwell delivered the fourth of the Aeronautical Society's series of educational lectures at Cricklewood. He explained that as the lecture dealt with such a large subject as "The Modern Aeroplane," it was very difficult to decide what to talk about and what not to talk about, and to add to the difficulty we were living under the shadow of the Defence of the Realm Act, which gave an additional reason for wondering just what one dare say about such a highly specialised war weapon as the modern aeroplane. I am sure, however, that all those present will agree with me that Captain Barnwell overcame these difficulties in a most admirable manner.

He made a start by explaining the functions of the various main members of an aeroplane, and gave a very interesting résumé of the various types of aero-engines, and gave as a general estimate that the petrol consumption of the modern water-cooled engine was 0.6 lb. per b.h.p. hour, and its weight about 3 lbs. per b.h.p. with radiators, explaining, however, that these weights were only realised in large engines of over 150 b.h.p., and the smaller water-cooled engines were generally heavier per h.p., and for this reason it was usual to employ rotary air-cooled engines for powers below 150 h.p., and stationary water-cooled engines for powers above that figure.

From engines the lecturer went on to propellers (I beg his pardon, airscrews), explaining that the maximum efficiency of an airscrew was when the advance per revolution was 0.8 of the pitch. He was also inclined to think that the two-bladed form of propeller was somewhat more efficient than the four-bladed.

Captain **BARNWELL** then went on to explain the functions of the aerofoils, dealing fully with the question of stagger and multiplanes and the body, which, he pointed out, was usually of a rectangular section, as this had proved the lightest shape for strength and the most simple to make and repair. It was also, he said, the most economical shape for stowing things (including human beings) into, and the most convenient to which to attach other members.

Captain **BARNWELL** then dealt with the various types of landing gears and tail skids, and stated that for his own part he preferred the "fixed" as against the steerable type of tail skid, as he considered they were much stronger and lighter, and as, when taxying, the airscrew must be running and driving a strong current of air against the rudder, it was quite possible to steer the machine without the aid of a steerable tail skid.

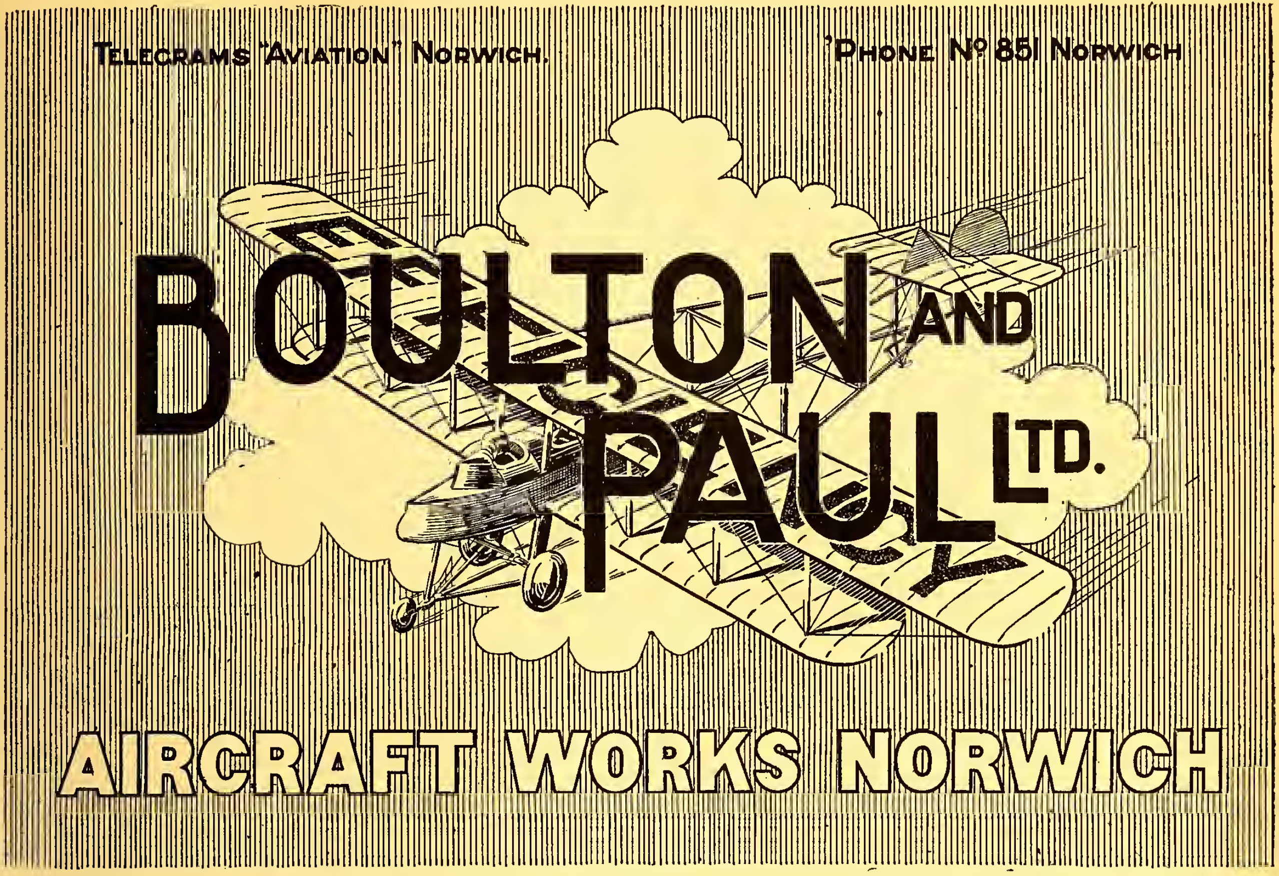
The question of the stabilising and controlling surfaces were next comprehensively and clearly dealt with. This was followed by some interesting comments on the various types of aeroplanes at present in use for scouting and reconnaissance, and he stated that it was possible to have tractor scouts to do anything up to 140 miles per hour, with proportionate climb, but of course he was not at liberty to give any details.

As regards bombing machines, the lecturer said he knew little, so should say even less. The points required in the modern war machine were, he said :—

(1) Great climbing power.
(2) Great speed, especially at high altitudes.
(3) Good view in every direction, any "blind" spots being a source of danger.
(4) Extreme ease and quickness in manœuvring.
(5) Greatest possible field of fire.
(6) Low landing speed.

Captain **BARNWELL** concluded his lecture with a humorous description of two possible future types of aeroplanes, the first being of a fast single-seater tractor monoplane with a big engine, the landing gear being very long skids only, as the machine could get off and land on these, because of its very light weight and enormous power per lb. weight. This weight should be about 1,200 lbs. empty, and could be obtained because of the very small tanks, no "gadgets" and low factor of safety required, as it would be a single speed machine, intended for nothing else. In connection with such a machine, Capt. Barnwell's figures were: Petrol and oil for half-hour's flight, at full power, 60 lbs.; light pilot, 140 lbs.; total loaded weight, 1,400 lbs. The body would be of an elliptic section, torpedo form, entirely enclosed, and of about 7 ft. cross-sectional area. The radiators would probably have a higher drag than the whole of the body. The speed attained should be about 215 m.p.h., and the loading would require to be about 24 lbs. per foot for maximum efficiency at the speed, giving an area for the aerofoils of about 60 h.p. The slowest possible landing with this loading would be about 90 m.p.h.

The second type of machine to which he looked forward was a single-screw trans-Atlantic tractor biplane, with about 200 h.p., and a totally enclosed torpedo-shaped body of elliptic section, and 10 ft. cross-sectional area. The machine would carry about 250 gallons of petrol and 20 gallons of oil. In this case the landing gear would be very long skids, fitted with wheels for getting off, these wheels to be dropped off bodily after the machine left the ground, as he thought the machine could land safely on the skids. Capt. Barnwell's figures for this machine were :—Machine empty, 1,500 lbs.; fuel and oil, 2,000 lbs.; two pilots, not quite so light as for the first machine, 350 lbs.; food, water (including



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microbes therein), instruments, etc., 50 lbs. Total at beginning of flight, 3,900 lbs., or, assuming that 13 gallons of petrol and one gallon of oil remained at end of flight, a mean weight of about 3,000 lbs. This would only require aerofoils of 300 square feet, as speed, and not climb, was essential. It should be possible in such a machine to fly across the Atlantic and lift the £20,000 prize in 20 hours. The slowest possible landing speed would be about 65 m.p.h.

Mr. Handley Page, A.F.Ae.S., said he was very interested in what Captain Barnwell had said, especially in what he had said about that "perfectly useless" (as it was sometimes referred to) type of large machine, which would lift 20,000 lbs. Mr. Page, explaining in answer to an interjection by Captain Barnwell, that he meant pounds in money, not weight, his mind running on a "plane" of monetary interest, rather than a lifting plane. In referring to the first of the two suggested types of machine, Mr. Page very much doubted the ability of such a machine to get off the ground with skids only, and, with regard to landing at 90 m.p.h., one would hardly expect to open the door of a carriage on a train travelling at 60 miles per hour and jump out with any hope of a safe landing, which was more or less what it came to. Mr. Page said he was sure the audience would have liked to hear more about the monoplane referred to by Capt. Barnwell, as he thought it must be one of his little "pets," and he might have given the audience a few details, as he was sure there were no German spies present.

Mr. H. Talbot, A.R.C.Sc., B.Sc., said that like Mr. Page he was extremely interested in the large type of aeroplane. If, he said, the aeroplane was to be a successful commercial proposition in the future, then the cargo and passenger carrying ability of the aeroplane must be developed, and he was of opinion that the firm who made large aeroplanes would make large money which, after all, was the criterion of success in this sordid world, but he did wish that those "wasters of wood and murderers of metal" could be induced not to cut down weight in order to get increased lift, but to attain the same end by increased speed. Mr. Talbot also said that, speaking from personal experience, if aeroplanes were to be used in the future for passenger carrying it would be necessary to make the passenger compartment reasonably sound-proof and weather-proof, as passengers he felt sure would very much object to being first deafened by the roar of the engines and then frozen to death by the elements.

Another speaker suggested to the lecturer that possibly the enormous potentialities of driving force contained in such explosives as T.N.T. might be used instead of petrol for propulsive purposes.

Captain Barnwell replied very ably to the various points raised, and an exceedingly enjoyable lecture was brought to a close by an exceptionally hearty vote of thanks proposed by the Chairman, Captain de Havilland.

STREAMLINE WIRES AND CABLES.

The following notes from one of considerable experience appear to be of interest to the Aircraft Industry :—

"I was greatly interested in your article recently on the above subject, and having studied Wire and Steel Cables in all their branches for many years, both practically and theoretically, I sincerely trust that your suggestions will bear fruit.

"There is no question but that all Steel Cables and Wires in connection with aeroplanes can be much improved, provided the authorities can be induced to listen to business men, and proper specifications drawn up by competent people in this line. I quite agree with your remarks with regard to 'Streamline Wires,' and to my mind the greatest disadvantage is their liability to break 'like a carrot' if a sudden strain is applied.

"This class of wire, even judging from the nature of the manufacturing processes through which it must go before it is ready for use, is not likely to withstand the many and varying stresses to which it is subjected. Take for instance a sudden jerk,—As the elongation in the Streamline Wire is very little it is certain if the particular wire upon which this strain has been put has been undergoing the usual tightening up—after every flight—it will break, but a cable, owing to its greater ductility and owing to the elongation which can always be obtained from a small cable with a short 'lay,' would withstand the shock.

"If the strain was very great the rope would probably break, but only in *two* strands, leaving four strands to take the weight until the machine landed, and this might be the saving of a pilot's life.

"With regard to the cross-bracing in Planes there is not the slightest doubt that small ropes would be vastly superior to the 'one wire' principle at present employed, as these ropes could be made of quite a mild quality of steel and still be equal in strain to the single high drawn wire. Then again they could be 'laid' up so that a given elongation is obtained, so that there would be no 'slackening' and generally would be easier on the Spruce Spars.

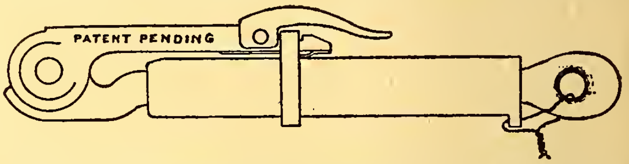
"The whole question of Wire Cables is one which ought to be looked into thoroughly so that our machines will become second to none. There never was any doubt that Britain was far ahead of Germany in Wire Cables, and it is our own fault if we do not take advantage of the knowledge at the disposal of the country. It is quite impossible, as every manufacturer will admit, to make Cables which would give much better results under the working conditions, higher breaking strains, cheaper prices and what is of more value at the present time a greater output. The bulk of the Steel Cables to-day are being made from absurdly small wires and, under the conditions which the ropes are running, nothing is gained.

"I sincerely trust that the 'powers-that-be' will come to realise that it is essential to take this matter up and ruthlessly scrap many of the theoretical ideas which have long since been surpassed, so that we may claim justly the proud position of First Air Power, and be a Pillar of Strength of the Allies."—Naze.

AN INGENIOUS TURNBUCKLE.

The New York and Hagerstown Metal Stamping Co., of Hagerstown, Maryland, U.S.A., have produced the unusual wire-strainer illustrated below.

The purpose of this turnbuckle is to pull together and tighten or loosen, as may be desired, an aeroplane bracing cable. This is obtained by turning the sleeve in one direction or the other to suit the required purpose.



The advantage claimed for this turnbuckle over all other types is that it can be attached and detached without changing the screw adjustment of the turnbuckle. It can easily be attached or detached, at the same time eliminating the necessity of re-adjustment.

It would be interesting to know how this turnbuckle compares, as regards weight and strength, with the more conventional examples.

LIGHT ALLOYS FOR AIRCRAFT.

With the object of co-ordinating the work which is now being done in connection with the use of light alloys in the construction of aircraft and aircraft engines, the Advisory Committee for Aeronautics has appointed a Light Alloys Sub-Committee. The members are Mr. Henry Fowler, Superintendent of the Royal Aircraft Factory, chairman; Lieut.-Commander C. F. Jenkin, R.N.V.R., and Professor F. C. Lea, representing the Air Board; and Capt. H. P. Philpot, Mr. A. W. Johns, and Dr. W. Rosenhain, representing respectively the Aeronautical Inspection Department, the Director of Naval Construction, Admiralty, and the National Physical Laboratory; together with the chairman of the Advisory Committee for Aeronautics, *ex officio*.

The functions of this sub-committee will be to advise Government Departments on questions relating to light alloys, to institute research for the development and improvement of such alloys and the methods of working them, and to assist in the removal of difficulties which may arise in their production and use. It will be in close touch with the experimental work on light alloys which is being carried out at the National Physical Laboratory, the Royal Aircraft Factory, the University of Birmingham, and elsewhere, and hopes to be able to give advice and assistance to manufacturers undertaking the production of light alloys and to founders engaged in the manufacture of engine parts, cylinders, pistons, crank cases, etc. It trusts to have the co-operation of firms who have undertaken such work, and will be glad to receive suggestions and give any possible help in answer to inquiries.

A NEW AVRO APPOINTMENT.

A recent appointment of interest to the Aircraft Industry is that of Mr. H. E. Broadsmith to be Works Manager of the Manchester works of A. V. Roe and Co., Ltd. Mr. R. J. Parrott, who was previously Works Manager at Manchester, has now become Works Manager of the firm's Southern factory, where his many years' experience of building experimental Avros will have still greater scope for usefulness.

Mr. Broadsmith has been with the Avro firm in various capacities for the past four years, so that he is thoroughly conversant with the firm's ways and is capable of carrying on the good work previously done by Mr. Parrott. He is not only an extremely hard worker as regards physical energy, but he is one of those people—all too few in this country—who is capable of running a business with his head. That is to say, he believes in and carries on real scientific management of the kind which increases output, and his long experience of workshop custom enables him to do this in a thoroughly practical way instead of merely operating on the usual red-tape methods learnt out of text books which is so often passed off as the real article.

Mr. Broadsmith is extremely popular with the Avro employees both in the works and in the office, and he can rely on their loyal backing whenever he calls upon them for an extra effort to produce output for the benefit of the Flying Services.

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Letters from a Munition Worker
To "Him"----Somewhere in France.

(*Reproduced from the "B.P.," the Works Magazine of Boulton and Paul, Ltd., Norwich.*)

LETTER No. III.

My Darling Jack,—There was a nice smell of cigarette smoke about your last letter. I don't suppose anybody else would have noticed it if they had had the chance to—and that's not likely!—but *I* noticed it. Can you guess how I managed to discover that you were smoking when you were writing to me, you dear old thing? Well, you *can* guess, I expect; there are no prizes for this guessing competition—at least, not yet.

I was very glad to find that you had your smoke, for I know what a hardship it would be to you to have no cigarettes. I have since heard from one of the girls who has a "friend" at the front—I know those "friends," don't you?—that you get tobacco served out to you as rations. I hope it's true. This girl's "friend" is a pipe smoker, and as most of his pals don't care for anything but cigarettes, he gets on very well. I think you must start to smoke a pipe when you come home, Jack. There's something so nice and homely about a pipe. Sometimes when I see Dad snuggling down in an easy chair with his paper and a pipe I wonder whether you—but that's looking too far ahead, isn't it?

The other evening I was reading your letters and trying to imagine that I wasn't really reading them, but that you were here and were talking to me. It wasn't very difficult, for you write just as you talk, darling. And when I had sat there thinking and thinking for a long time I put out the light and sat at the window and tried to imagine just where you were, and what you were doing. I think I must have fallen asleep, for I distinctly saw an aeroplane in the sky, and something seemed to tell me that it was carrying you. If only dreams would come true sometimes!

We have one girl who must be rather an expert on dreams, I think. She always seems to be half asleep when she ought to be at work. I can't stand a girl like that. One of the other girls put it down to "being in love and not being used to it," but I don't agree with that. It seems to me that if a girl is in love, she ought to work all the better and all the harder, because she has somebody else beside herself to work for. I know Dad always says that he never really put his back into his work until he met Mother, and then he did his best to make work scarce. But you will often see this girl with a piece of wood in her hand and apparently wondering what she is to do with it. I feel as though I should like to go and shake her, to wake her up!

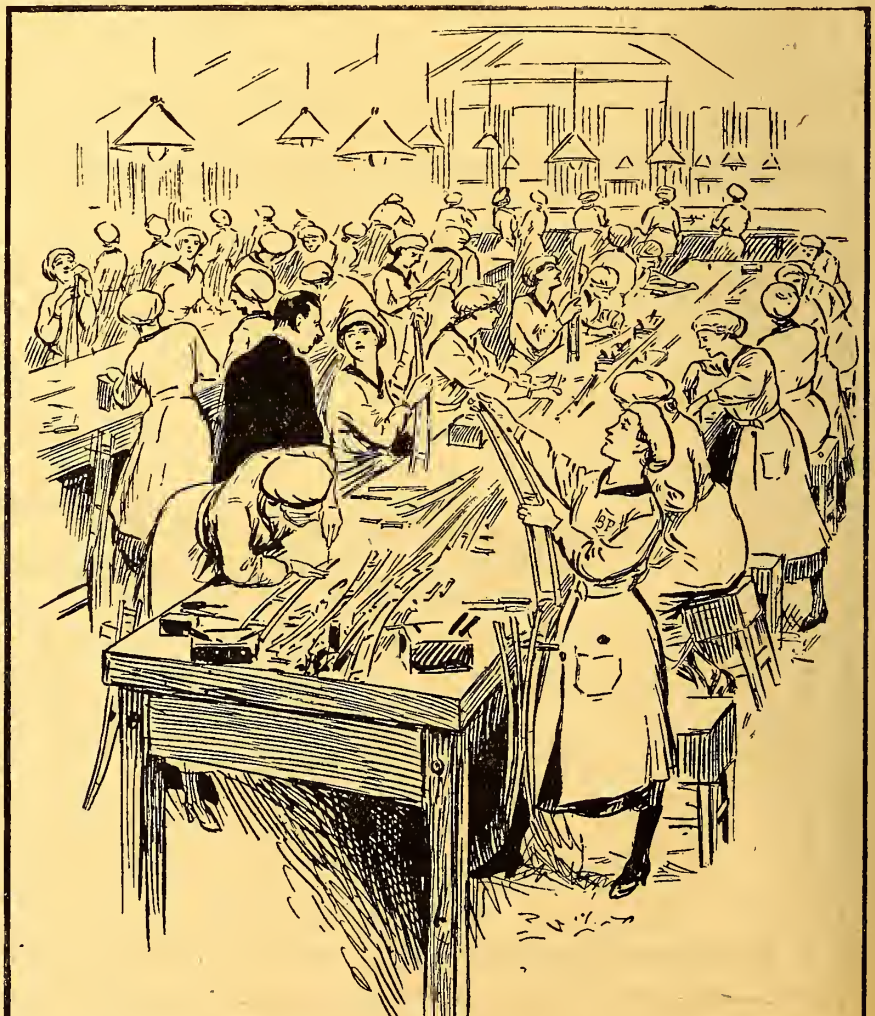
There's one very, very nice girl here. Everybody likes her. She knows how to be a real Christian without making a fuss about it. The other day some girls were talking about "keeping Christmas," and somebody asked this girl what she thought was the best way to keep Christmas. She replied quite quietly and without any "side" that she thought the best way was to keep Christmas all the year round. Some of the others laughed, but I know what this angel of a girl meant. She doesn't believe in being specially kind to people at one season of the year only: she spreads her goodwill over the 365 days. Now, isn't that a nice way of keeping Christmas, Jack?

We're awfully busy here. I often say to myself, "Next week we shall be slack," because it seems impossible that the Army can want any more aeroplanes, but the cry still is for "More!" I thought at first when I came here that the work would be very monotonous, but it isn't. It's nice to see the work growing under your hands, and to know that it is just the work that is wanted. There's always something happening

The other day a girl came to work with a signet ring on one of her fingers. Her brother had given it to her. You needn't smile, because he really was her brother. Well, after a bit her finger began to swell, and she couldn't get the ring off. We chaffed her about it, but it was really no joke, and in the end she had to go to a jeweller's and have it cut off. I'm glad the third finger of my left hand doesn't swell. I don't believe in "luck," for I always think that your luck is very much what you make it yourself, but all the same I shouldn't like to have my ring cut off my finger; I think I'd almost as soon have the finger off.

We are having a spell of very cold weather, but nobody grumbles—not really—because I am sure they all say to themselves that it must be a jolly sight worse in the trenches than it is in a workshop. Some time ago a girl who is not too fond of fresh air came to work all muffled up to her eyes nearly and wearing a very woolly coat. We called her "Teddy Bear," but though there have been a good many like her since then, still the name has stuck to her. They haven't found a nickname for me yet. I'll tell you what it is when I hear it. What do you think it ought to be, Jack? I've just upset the ink bottle, and my hands are so cold I can hardly hold the pen. Perhaps you can make something out of that.

It's rather a strange thing, but I think that the people who are not engaged on war work are the people who talk most about the war. I suppose the truth is they haven't got very much work to do at all. You hear a lot of talk from outsiders about what is going to happen when the war is over, but we are not thinking about that time just now—for a very good reason. Still, I



"We're awfully busy here."

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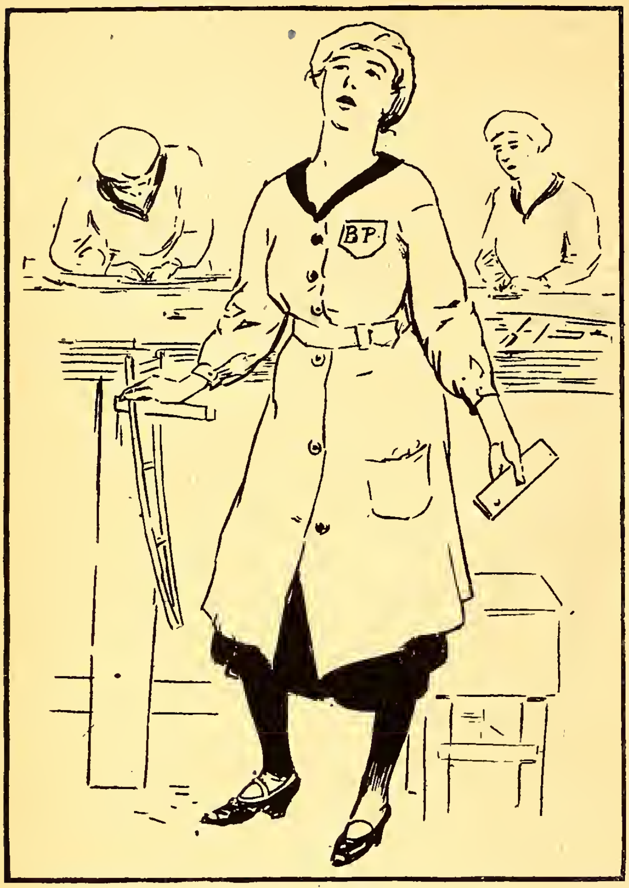

"She always seems to be half asleep."

think when the war is over some of us girls who have helped to make the aeroplanes should be allowed to have a joy-ride in one—a kind of reward for good conduct.

The other day one of the girls had a "friend"—it's surprising what a lot of girls have "friends" somewhere or other, and the "friends" are always men—who had come home from somewhere ever so far away. I've forgotten the place, but it's nowhere near you or near Europe either. This "friend" was in rather a hurry, and one day, thinking that the boat was going rather slowly, he got hold of one of the sailors and asked if it wouldn't help matters if they used a sail.

"Yes," said the sailor, "it would do a lot of good—about as much good as if you got out and pushed!"

Will the boat go fast enough for you, Jack, the next time you have leave?

I must say good-bye for a time, or I shall be late in the morning. All my love.

Ever your devoted, ———.

AIRCRAFT WORK FOR WOMEN.

Lord Derby, addressing a meeting at the Albert Hall on March 17th, said:—"The War Office will require the help of something like 6,000 women in connection with the work of the Royal Flying Corps alone."

An ex-kitchen maid is driving a 900-h.p. engine in an aeroplane factory near London.

The enormous extensions which have been made in the work have outstripped the supply of labour.

Much of the work in connection with the making of aeroplanes is extremely delicate. It is no small triumph for women that their work has proved altogether satisfactory.

Not only are they employed in sewing work in connection with the wings, "doping," and milling, but they are now concerned with the manufacture of almost every part of an aeroplane. They have, in addition, proved extraordinarily successful at the work of inspecting and gauging, by which the output of each factory is tested.

Delicate parts of the machine which have to be true to one-thousandth of an inch are successfully tested by women.

Women with an engineering turn of mind and some education are especially fitted for this work. Among the "jobs" for which volunteers are especially invited are fitting, dismantling engines, detail fitting, valve grinding, and engine painting, while storewomen and clerks are in demand. Women who feel themselves fitted for this class of work should apply to the Director of National Service (Women's Section), St. Ermin's Hotel, Westminster.

TESTING AEROPLANES.

The final task of an aeroplane manufacturer in handing his productions over to the Naval or Military Department concerned with their delivery, is to convince the appointed officials that each individual machine is fully up to the standard laid down when the type was originally requisitioned.

The practice is for each machine to be tested by a Service pilot or an approved civilian pilot, in the presence of the manufacturer's representatives, the manufacturer assuring himself beforehand that the machine is erected with sufficient accuracy to ensure that the requirements will be fulfilled.

In the case of trials carried out by civilian testers, aircraft constructors provide for the services of a first-class pilot who can be relied upon to get the best possible performance out of an aeroplane. In this connection a manuafcturer has the choice of retaining a pilot himself, or of hiring the services of such a man when occasion demands. At the time of the outbreak of the war, there were very few really first-class pilots available in this country for civilian test flying, and it was frequently difficult to obtain the occasional services of such unattached pilots.

This difficulty was very largely solved in November, 1915, by the formation of the firm of Pickles and Prodger, in association with Mr. Bernard Isaac, the only regular firm of aeroplane testers in the world. The careers of Messrs. Sydney Pickles and Clifford B. Prodger are so well known as not to need recapitulation here. It is sufficient to say that, at the time of the formation of the firm, they had between them flown different types representing the great majority of land machines and seaplanes then existing.

After doing a great deal of extremely useful work, Mr. Sydney Pickles resigned from the firm for personal reasons, since which date the firm has adopted the style of the Prodger-Isaac Aviation Co. Mr. J. Lankester Parker and other skilled pilots are associated with Mr. Prodger in the work of testing.

Official acceptance tests embrace trials for endurance, rate of ascent and speed, and the registration of the performance of a machine in these three respects involves the use of a number of instruments, all of which have to be calibrated with accuracy.

At the commencement of the trials, the actual weight carried by the machine is taken; the fuel and petrol are measured, and note is made of all the accessories in the way of passengers, wireless outfit, bomb and gun load and so forth, which are required to be carried.

Equal care is taken to check the weight of the remaining fuel after the trial in order that the petrol oil and water consumption may accurately be determined.

The Acceptance Officer is naturally concerned with other aspects of the aeroplane than its mere brute performance, and he has to be satisfied upon the general running of the machine with respect to absence of unreasonable vibration, quickness in starting up the engines, and with regard to the reasonable condition of the whole apparatus at the conclusion of the trial as, naturally, no machine will be accepted which is merely capable of performing a trial with brilliance, but which finishes up in the condition of a hero at the end of a Marathon race.

Mr. Prodger and the pilots associated with the Prodger-Isaac Aviation Co. are naturally specially concerned that a machine shall go through its trials under the best possible conditions, and they do not hesitate to land for adjustments of engines, controls, flying wires, etc., which in their opinion may be desirable.

The work of the test pilot is of a most arduous nature, and the inspection of his diary would be an education upon the subject of rapid travel. He may have to fly as many as a dozen machines of widely varying types in a week, at five or six aerodromes, all over the country, which naturally necessitates strenuous travelling in cars and trains, as well as by air. The element of danger is also always present, although it has been reduced by the care of expert pilots to a very low degree; and aircraft constructors have much for which to thank them, with respect to the relatively low premiums now charged by insurance companies upon machines under test.

In addition to official acceptance tests and cross-country delivery flights, the firm undertakes experimental flying, with machines of new types, and its pilots are qualified to pass expert opinion upon the flying qualities of any aeroplane or seaplane, and to offer suggestions as to the practicability of its further development.

Much work of this nature has been carried out in the past, particularly by Mr. Prodger. Naturally, it is impossible to give details of the work actually performed. It is sufficient to say that the machines tested range from the smallest to the largest in the world. It is already known that Mr. Prodger has carried out most of the experimental flying in connection with the big Handley Page biplanes, upon one of which he created a world's record by taking twenty passengers to an altitude of seven thousand feet. These machines have since created other records, of which it is not at present permissible to speak.

The firm has undoubtedly been of great service in the performance of this work, and one looks forward to the day (and the day will come) when it will be sure to take part in the testing of the first real trans-Atlantic aerial liners, and the aeroplanes for the London-Paris-Pekin mail.—W. L. W.

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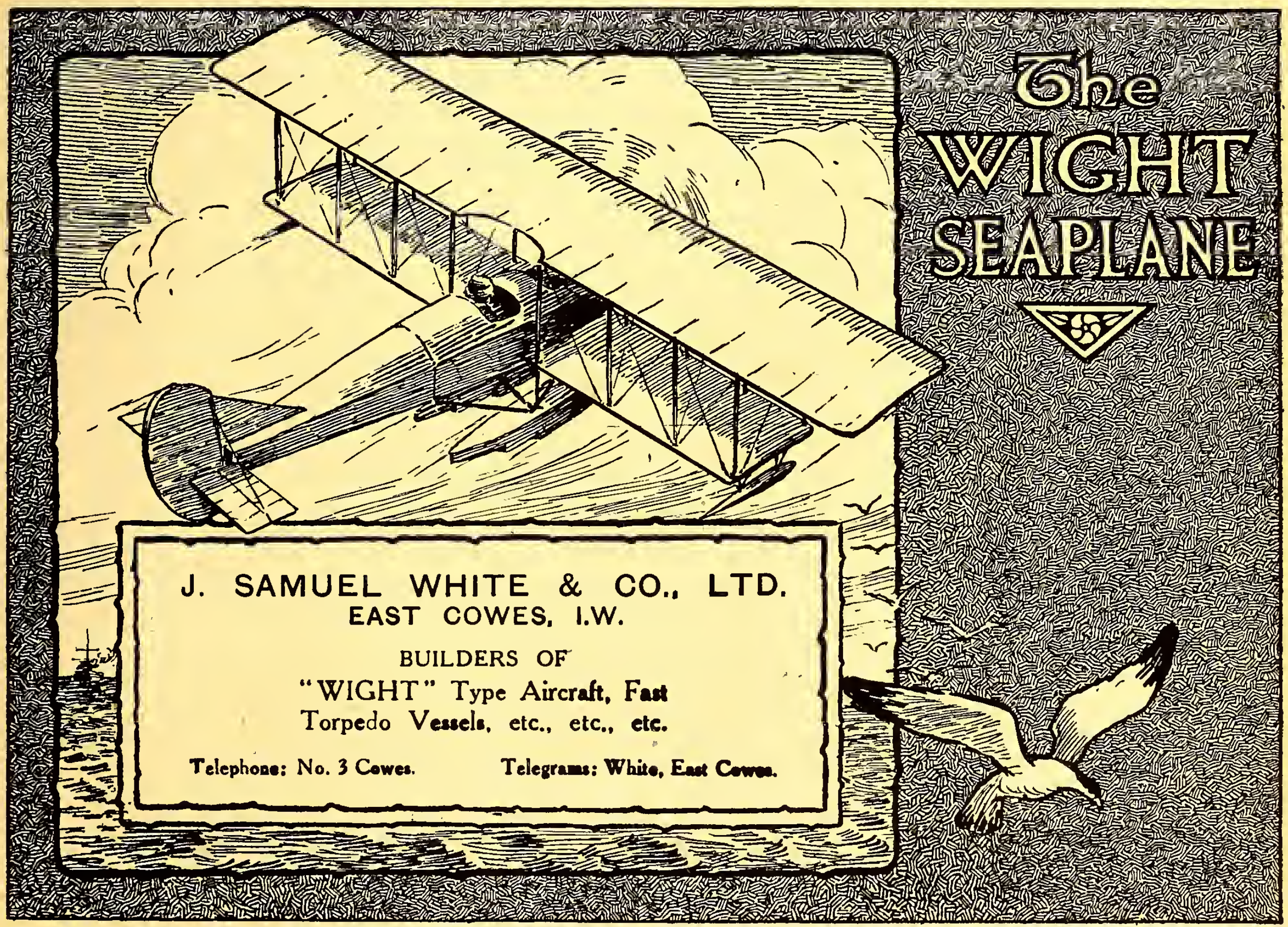

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THE BEARDMORE AERO ENGINE.

The many users of Beardmore Aero Engines in both Services may be interested to know that an excellent instruction book has been produced relating to the care and up-keep of this motor.

The instructions cover the 90, 120, and 160-h.p. models and give information upon all phases of aero-engine usage. Much useful advice is given on making carburettor and magneto adjustments to suit different conditions, and the directions as to how to regain lost tune are set forth in a very practical manner.

An exceedingly useful feature of the book are tables on standing fits and clearances in the various moving parts of both the 120 and 160-h.p. engines, which are naturally of great use in re-assembling these engines and in determining the degree of wear and tear suffered by the various parts.

One eminently sensible point about the Beardmore engines is that the 160-h.p. engine has been designed to fit the same bed as the 120-h.p., so that so far as engine-bearers and holding-down bolts are concerned the two are interchangeable.

One learns many interesting minor details from the book, all of which help to impress on one the fact that the engine is made and handled by people who know their job. For instance, the recipient of an engine complete in case is advised to examine the construction of the case before unpacking, because the case has been specially designed to provide a simple and safe means of removing the engine without damage. This will probably come as a new idea to the Service mechanic whose general idea is to open a case any way up with a cold chisel and hammer.

Good sound advice is given as to the proper type of engine bearer for the engine, and the proper way of tightening up the holding-down bolts,—another matter about which mechanics are apt to be careless. It is further noted that the bolts should be tightened up again after the engine has had its first run, and has bedded itself down a bit.

The question of cooling has not been forgotten, and advice is given as to the proper temperature for the cooling water, the proper head of water above the cylinders, the effects of over-cooling, and the margin to be allowed in filling to provide for water expansion.

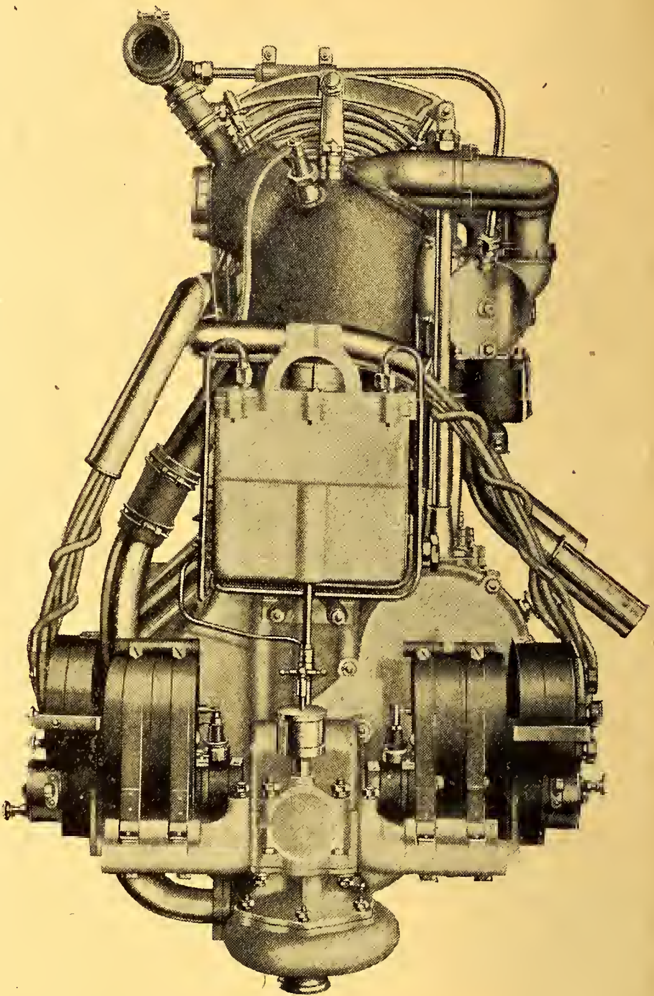
The proper method of fitting a new propeller sleeve to the taper of the shaft is described in detail, for simple as the job may seem, there are certain little matters which may lead to big trouble if neglected.

Even on the subject of petrol tanks the producer of the book has had the good sense to remind users that a gravity tank must have an air-vent in the filler cap. It would be interesting to know how many perfectly good engines of various sorts have been condemned because they suffered from some undiscovered petrol starvation when this simple point has been overlooked.

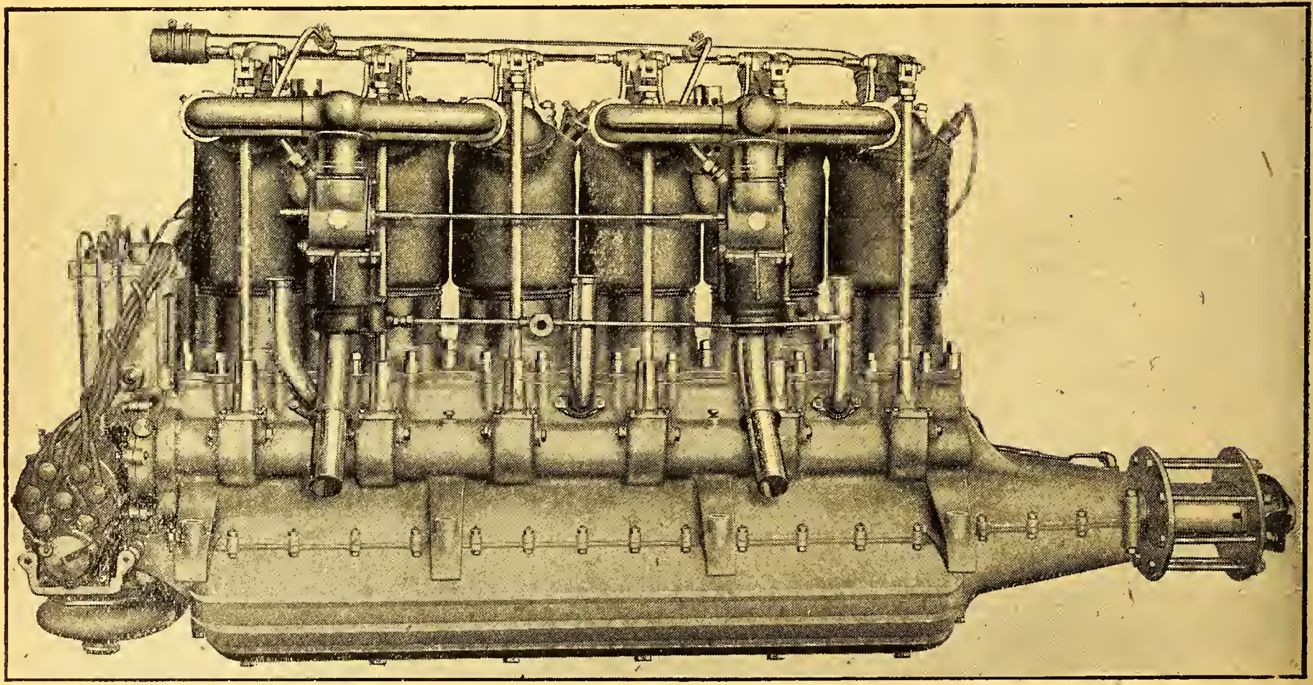
Advice is given as to "grooming" the engine after each flight and after every 12 hours of running, such as—in the latter case—washing out the crank case with paraffin, and cleaning the cylinder-wall oil-feeds.

The process of examination after 150 hours' running is described at length, and, if carefully followed, will be much to the advantage of Beardmore users. In fact the book is full of valuable hints and tips about running the engine, and if the mechanics in charge of these engines follow them carefully they will save themselves much trouble and probably save not a few valuable lives and aeroplanes.

Applications for copies of this book should be made to the Beardmore Aero Engine, Ltd., 112, Great Portland Street, W.1.



End View of the Beardmore Engine.



Side View of the Beardmore Aero-Engine, with which the book reviewed above deals comprehensively.

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MARKET REPORTS.

Prices Given are for Quantities on Usual Terms.

March 21st, 1917.

I give below a more comprehensive list of Aircraft Materials and Parts, directly affected by the raw materials generally included in these reports, and buyers are advised to make a careful note of them.

COPPER.—Sheet, Tube, Ingots, Wire, Tacks, Rivets, Nails, Ferrules, Thimbles.

STEEL.—Sheet, Tube, Bar, Fork Ends, A.G.S. Pins, Turnbuckles, Universal Joints, Streamline Wires, Swaged Rods, Axles.

ALUMINIUM.—Sheet, Tube, Bar, Ingots, Rivets.

TIMBER.—Ash, Spruce, Walnut, Mahogany, Propellers, Ash Bends, Three-Ply.

FABRIC.—Tapes, 17C Linen, Webbings, Spaced Fabric.

COPPER.—The Copper Market is unchanged. A considerable quantity of Scrap Metal is being used instead of new Copper, and the economical use of the metal will certainly influence the market shortly. There are ample supplies available at present. Regular supplies are now coming from abroad.

Current Prices.—Standard Cash Terms.—Price to-day, £136; a week ago, £136; last year's average, £116; Copper Sheets, £174; Copper Tube, 20¾d.; Brass Tubes, 17½d.; Brass Sheet, 16⅝d.

STEEL.—As stated last week, several mills are increasing their outputs considerably. I now learn that very large extensions are being made in Sheffield and considerable increases in the output of Steel will be made when they are completed.

Manufacturers are hopeful that the present stagnation will be eased in the near future.

Very stringent restrictions have recently been put on Export trade, making it extremely difficult to place private orders.

We cannot expect any steel from U.S.A. In the first place, American producers are asking absurd prices. Secondly, they are receiving more than enough orders for domestic requirements.

Current Average Prices.—R.A.F. 3A Steel, 48s. to 52s. +Tests. R.A.F. 1E Steel, 82s. Basis +Tests. R.A.F. 9A Steel Sheet, 28s. to 29s. 6d.

ALUMINIUM.—The Director of Materials has now assumed absolute control of all aluminium, and prices for scrap and remelted ingots and new material are under official control.

Comparison of Prices.—Aluminium Ingot.—To-day's price: £225. A year ago, £155. Two years ago, £81D/D. Aluminium Sheet.—To-day's price: 2s. 10½d., 19G. A year ago, 2s. 1½d., 19G.

TIMBER.—Prices remain the same, but Mahogany will certainly make a jump soon. It is generally admitted that a long period of famine prices is before us, and readers will remember that I anticipated this in my report of March 7th.

Current Prices.—Silver Spruce, 13s. to 14s. c.f. English Ash, 12s. to 13s. c.f. Walnut, 2s. 3d. s.f. Mahogany Log, 1s. 9d. s.f. Mahogany Plank, 1s 10½d. to 2s. s.f. Prices are for selection and delivery.

FABRIC.—Manufacturers still wait for the slow wheels of officialdom to move. Nothing definite has been settled, and the leading Irish companies fail to see the necessity for Government control.

Ample supplies were available for aircraft firms, and although official prices will apparently go against the buyer, the mills would have preferred an open market.

PRACTICAL SYMPATHY.

It is interesting to note that the staff and workers of Gwynnes, Ltd., Hammersmith and Chiswick, makers of the "Clerget" Patent Aero Engine, which is doing such good work for both Services, have contributed the handsome sum of £317 to the funds of the Royal Naval Air Service and Royal Flying Corps.

CAPITAL REQUIRED.

The writer happens to know at the moment of a sound opportunity for investment. An engineering firm of good standing, whose principals have been well known to him for a number of years, is on the look out for additional capital to the extent of about £10,000. Their factory is in London and is engaged on war-work of great national importance. Active assistance on the part of the investor would be welcomed.

The writer will be pleased to put any reader who is really interested in such a proposition in touch with the firm in question. In a matter of this kind the reputation of this paper is concerned, so it may be taken that publicity would not be given to the proposal unless the reputation of those requiring capital was above suspicion. Letters should be addressed personally to the Editor of The Aeroplane, 166, Piccadilly, W.1.

New Patents.

This list is specially compiled for The Aeroplane by Rayner and Co., Registered Patent Agents, 5, Chancery Lane, E.C.

Latest Patent Applications.

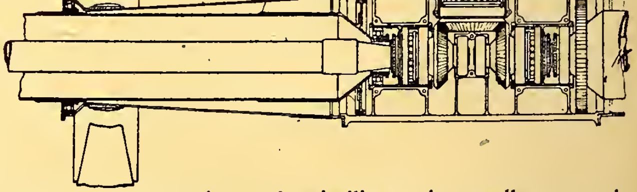
3723. T. H. F. Burditt. Airships. 14/3/17.
3743. T. H. F. Burditt. Aircraft. 14/3/17.
3728. T. W. Cherry and W. E. Harker. Aeroplanes, seaplanes, etc. 14/3/17.
3725. Fairey Aviation Co. Aeroplanes, etc. 14/3/17.

Specifications Accepted This Week.

104,114. T. D. Kelly. Aeronautical machines.
104,125. F. H. Royce, B. I. Day, and Rolls-Royce, Ltd. Landing gear for aircraft.

Latest Published Abstract.

103,278. Aeronautics. F. H. Royce, Nightingale Road; B. I. Dale, 49, Harrington Street; and Rolls-Royce, Ltd., Nightingale Road, Osmaston Road, all in Derby.



Means for supporting and swivelling twin-propellers comprise an outer casing formed by the gear-box g, and two tubes t^1, t^2, fastened rigidly thereto, swivelling tubes s^1, s^2 mounted in bearings concentric with the outer casing, cross-driving shafts d^1, d^2 within the swivelling tubes, means for operating the swivelling tubes, and brackets, stays, or struts for rigidly fastening the outer casing to the framework.

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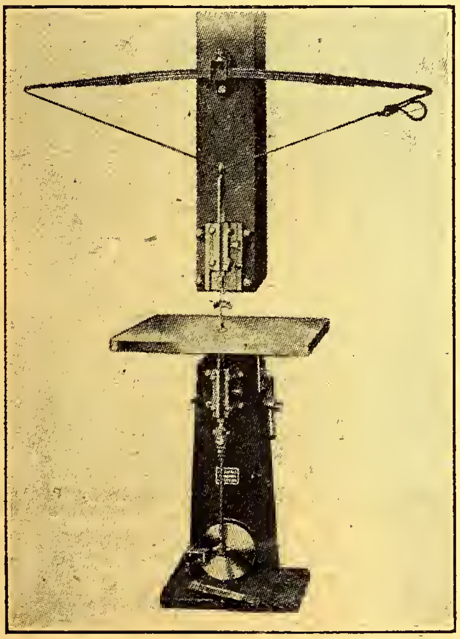

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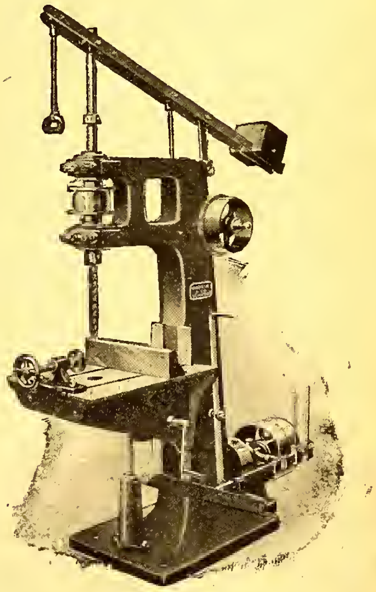

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Aircraft Manufacturing Co., Ltd., 47, Victoria St., S.W.
Armstrong, Sir W., Whitworth & Co., Ltd., Newcastle-on-Tyne
Blackburn Aeroplane & Motor Co., Ltd., Olympia, Leeds
Bleriot & Spad Aircraft Works, Addlestone, Surrey
Boulton & Paul, Ltd., Rose Lane Works, Norwich
British & Colonial Aeroplane Co., Ltd. (The Bristol Co.), Filton, Bristol.
British Caudron Co., Ltd., Broadway, Cricklewood, N.
Canute Airplane Co., Royal Pier Gate, Southampton.
Curtiss Aeroplane Co., L. J. Seely, Clun House, Surrey St., Strand, W.C.
Davidson Aviation Co., Ltd., Hammersmith, W.
Eastbourne Aviation Co., Ltd., Eastbourne
Grahame-White Aviation Co., Ltd., London Aerodrome
Handley Page, Ltd., 110, Cricklewood Lane, N.W.
London Aircraft Co., Urswick Rd., Lower Clapton, London, N.E.
Mann, Egerton & Co., Aircraft Works, Norwich
Martinsyde, Ltd., Brooklands, Byfleet
National Aircraft Co., Ltd. 15, Hackney Rd. N.E.
Navarro Aircraft Co., Ltd., Burton-on-Trent
"Nieuport" & General Aircraft Co., Cricklewood, London, N.W.2.
Norman-Thompson Flight Co., Ltd., Bognor
Roe, A. V., & Co., Ltd., Manchester
Sage, F., & Co., Ltd., Peterborough
Saunders, S. E., Ltd., East Cowes, I.O.W.
Short Bros., Rochester, Eastchurch and Whitehall House, S.W.
Sopwith Aviation Co., Ltd., Kingston-on-Thames
Standard Aircraft Manufacturing Co., Effingham House, Arundel St., W.
Vickers, Ltd., Imperial Court, Basil Street, Knightsbridge, S.W.
Waring & Gillow, Ltd., Hammersmith
Wells Aviation Co., Ltd., 10a, Elystan Street, Chelsea
Westland Aircraft Works, Yeovil
White, J. Samuel, & Co., Ltd., East Cowes
Worms Aircraft Construction Co., Twickenham

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Short Bros., Rochester, Eastchurch and Whitehall House, S.W.

ALUMINIUM CASTINGS—
Coan, R. W., 219, Goswell Rd., London, E.C.
Willans & Robinson, Ltd., Victoria Works, Rugby

ASH BENDS—
London Aircraft Co., Urswick Rd., Lower Clapton, London, N.E.

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London Aircraft Co., Urswick Rd., Lower Clapton, London, N.E.

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The Deptford Steel & Iron Works, Ltd., 1 and 2, Old Pye St., Westminster

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Fairby Construction Co., Ltd., 117, Victoria St., S.W.
The Wilfley Co., Ltd., Salisbury House, London Wall

CARBURETTORS—
Hobson, H.M., Ltd., 29, Vauxhall Bridge Road

CASTINGS (Aluminium)—
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Willans & Robinson, Ltd., Victoria Works, Rugby

CLOTHING—
Dunhill's, Ltd., Euston Rd., N.W.
Hazel & Co., 4, Princes St., Hanover Sq., W.
Robinson & Cleaver, Ltd., Regent St., London, W.

COMPONENT PARTS—
B. D. V. Aircraft Spares, Syon Chambers, 16a, Kew Road, Richmond, Surrey
Central Aircraft Co., Palmerston Works, High Rd., Kilburn, N.W.
The Osborne Aircraft Co., Ltd., Whin Hill, Greenock, Scotland
Ward, Fredk., 6, 7, & 8, Allsop St., Upper Baker St., W.
Worms Aircraft Construction Co., Twickenham

CORDS, TAPES AND THREADS—
MacLennan, J., & Co., 30, Newgate St., E.C.1., and at Glasgow

DOPES—
British Aeroplane Varnish Co., Ltd., Milburn House, Newcastle-on-Tyne, and 166, Piccadilly
British Cellulose Co., 8, Waterloo Place, S.W.
Cellon, Ltd., Broad St., House, New Broad St.
Emaillite, General Aeronautical Co., Ltd., 30, Regent St., S.W.

ELECTRICAL ACCESSORIES—
The Edison Swan Electric Co., Ltd., Ponder's End, Middlesex

ENGINES AND PARTS—
Arrol-Johnston, Ltd., Dumfries
Beatty School of Flying, Ltd., London Aerodrome
Beardmore Aero Eng., Ltd., 112, Great Portland Street
Dudbridge Iron Works, Ltd. (Salmson), 87 Victoria St., London, S.W.
Gordon Watney, Ltd., Messrs., Weybridge
Green Engine Co., Ltd., Twickenham
Gwynnes, Ltd., Hammersmith Iron Works, Hammersmith, W.
Sturtevant Motors Co., 147, Queen Victoria St.
Sunbeam Motor Car Co., Ltd., Wolverhampton
The Gnome & Le Rhone Engine Co., Ltd., 47, Victoria St., S.W.
Willans & Robinson, Ltd., Victoria Works, Rugby.

FABRICS AND YARNS—
MacLennan, J., & Co., 30, Newgate St., E.C.1. and at Glasgow. Tapes, Cords & Threads.

FLYING SCHOOLS—
Bournemouth Aviation Co., Ltd., Talbot Village, Bournemouth
Hall Aviation Co., London Aerodrome, Hendon

GALVANISING—
Cowper-Coles Manufacturing Co., Sunbury-on-Thames
Boulton & Paul, Ltd., Rose Lane Works, Norwich

GEARS—
Moss Gear Co., Ltd., Thomas St., Aston, Birmingham

GLUE—
Adams & Co., Ltd., West Bromwich
Improved Liquid Glues Co., Ltd., Gt. Hermitage Street. (Croid.)
Mendine Co., 8, Arthur St, E.C.

GYROSCOPES—
The Sperry Gyroscope Co., Ltd., 15, Victoria St., London, S.W.

INSTRUMENTS (Speed and Pressure Indicators, Revolution Counters, Altimeters, Watches, etc.)—
British Wright Co., Ltd., 33, Chancery Lane

MACHINE TOOLS—
Bliss, E. W., & Co., 2a, Pocock St., Blackfriars Rd., London, S.E.
Brewster & Co., 11, Queen Victoria St., E.C.

METAL MANUFACTURERS—
Chas. Clifford & Son, Ltd., Birmingham.

METAL PARTS AND FITTINGS—
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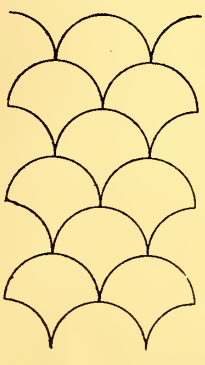

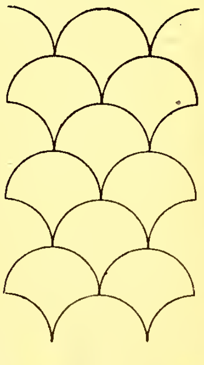

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(Continued from page 786.)

TERRITORIAL FORCE.—INFANTRY.—HAMPS. R.—Sec. Lt. (temp. Lt.) D. C. Knott is secd. for duty with R.F.C., Feb. 24th.

GORDON HIGHRS.—Sec. Lt. A. N. McQueen is secd. for duty with R.F.C., Feb. 28th.

LOND. R.—Sec. Lt. (temp. Capt.) L. C. Coates is secd. for duty with the R.F.C., Feb. 27th. Sec. Lt. (temp. Lt.) C. F. Bailey is secd. for duty with R.F.C., Feb. 24th. Sec. Lt. R. A. Raleigh is secd. for duty with R.F.C., Feb. 10th.

CYCLIST BN.—Sec. Lt. J. Brodie is secd. for duty with the R.F.C., Feb. 25th.

* * *

From the "London Gazette" Supplement, March 22nd, 1917.

WAR OFFICE, March 22nd.

The following Warrant Officer to be Sec. Lt. for service in the Field :—

REGULAR FORCES.—INFANTRY.—SOM. L.I.—Sgt.-Maj. J. Bullock, from R.F.C., Feb. 20th, seny. from Dec. 14th, 1916, and to be secd. for duty with the R.F.C.

MEMORANDUM.—For duty with R.F.C. :—Actg. Sgt.-Maj. W. C. Hayward, from R.F.C., Feb. 19th.

The following N.C.Os. and men to be temp. Sec. Lts. :—

MEMORANDA.—For duty with R.F.C. :—1st. Cl. Air Mech. F. Crompton, from R.F.C., Feb. 7th. Cpl. R. C. Jenkins, from R.E., Feb. 8th. Sgt. G. O. Smart, from R.F.C., Feb. 21st. Sgt. R. G. Malcom, from R.F.C., Feb. 24th. Actg. Sgt. E. J. Briscoe, from L'pool R., Feb. 26th.

REGULAR FORCES—ESTABLISHMENTS.—R.F.C.—MIL. WING. —Flt. Comdr.—Temp. Lt. B. St. J. Boultbee, Gen. List, from a Flying Officer, and to be temp. Capt. whilst so empld., March 13th.

Flying Officers.—Temp. Sec. Lt. S. Cockerell, Gen. List, Nov. 10th, 1916. Sec. Lt. J. R. Taylor, Rif. Brig., and to be secd., Jan. 29th. Sec. Lt. G. C. Matthews, Aust. L. Horse, Feb. 7th. Temp. Lt. A. S. Travers, R. Muns. Fus., and to be transfd. to Gen. List; Sec. Lt. R. M. Rankin, Sco. Rif., Spec. Res., and to be secd.; Temp. Sec. Lt. (on prob.) H. J. Scales, Worc. R., and to be transfd. to Gen. List; Sec. Lt. J. B. Thomas, Spec. Res., Feb. 9th. Temp. Lt. C. McM. Laing, M.C., R. Sc. Fus.; Sec. Lt. A. J. J. O'Farrell, E. Lan. R., T.F., and to be secd., Feb. 10th. Temp. Sec. Lt. F. Wright, attd. N. Staff R., and to be transfd. to Gen. List; Sec. Lt. E. F. Colman, S. Staff R., T.F., and to be secd.; temp. Sec. Lt. A. B. Anstey, Gen. List; temp. Sec. Lt. (on prob.) R. S. Twigg, Gen. List, Feb. 28th. Temp. Capt. G. Ross-Soden, Gen. List, a Flying Officer, relinquishes appt. of Wing Instr. in Gunnery (graded as a Flt. Comdr.), and reverts to rank of temp. Sec. Lt., Dec. 29th, 1916.

Flying Officers (Observers).—Sec. Lt. R. A. Raleigh, Lond. R., T.F., and to be secd., Feb. 10th, seny. from Sept. 28th, 1916. Sec. Lt. J. Brodie, Cyclist Bn., T.F., and to be secd., Feb. 25th, seny. from Sept. 29th, 1916. Sec. Lt. A. N. MacQueen, Gord. Highrs., T.F., and to be secd., Feb. 28th, seny. from Oct. 16th, 1916. Temp. Sec. Lt. W. T. Gilson, Gen. List, Jan. 6th, seny. from Oct. 29th, 1916. Temp. Sec. Lt. (on prob.) C. Dixon, Gen. List, Feb. 25th, seny. from Oct. 29th, 1916. Temp. Sec. Lt. (on prob.) C. S. Goodfellow, Gen. List, Feb. 27th, seny. from Oct. 29th, 1916. Sec. Lt. (temp. Lt.) K. A. S. G. N. Fearnside-Speed, A.S.C., Spec. Res., seny. from Nov 7th, 1916. Temp. Sec. Lt. L. A. Norris, R.E., seny. from Nov. 13th, 1916, Feb. 28th. Temp. Sec. Lt. W. Wallace, Gen. List, Feb. 25th, seny. from Nov. 13th, 1916. Temp. Lt. E. B. Maule, High. L.I., and to be transfd. to Gen. List, Feb. 5th, seny. from Nov. 14th, 1916. Sec. Lt. W. Gray, Gord. Highrs., Spec. Res., and to be secd., March 3rd, seny. from Nov. 14th, 1916. Temp. Sec. Lt. V. C. Morris, A. Cyclist Corps, and to be transfd. to Gen. List, Feb. 27th, seny. from Nov. 18th, 1916. Temp. Lt. G. W. Swann, A.S.C., and to be transfd. to Gen. List, Feb. 28th, seny. from Nov. 19th, 1916. Temp. Sec. Lt. (on prob.) F. M. Myers, M.C., Suff. R., and to be transfd. to Gen. List, Feb. 13th, seny. from Nov. 23rd, 1916. Temp. Sec. Lt. R. C. Doughty, Gen. List, Feb. 28th, seny. from Nov. 28th, 1916. Temp. Sec. Lt. (on prob.) W. K. Carse, Gen. List, Feb. 12th, seny. from Dec. 9th, 1916. Temp. Sec. Lt. (on prob.) H. L. Waddington, Gen. List, Feb. 28th, seny. from Dec. 18th, 1916. Lt. D. J. McRae, Canadian Inf. Bn., Jan. 31st, seny. from Dec. 20th, 1916. Temp. Sec. Lt. F. C. Elstob, attd. R. Fus., and to be transfd. to Gen. List, Feb. 25th, seny. from Dec. 29th, 1916. Lt. (now Capt.) W. A. Hannay, L'pool R., and to be secd., Feb. 14th, seny. from Jan. 4th.

Adjts.—Lt. (temp. Capt.) T. E. Longridge, A.S.C., and to retain his temp. rank whilst so employed, in succession to Sec. Lt. (temp. Capt.) B. E. Sutton, Yeo., T.F., June 23rd, 1916, substituted for the notification in the "Gazette" of July 22nd, 1916. Lt. H. French, W. York R., Spec. Res., from a Flying Officer (Observer), vice Sec. Lt. (temp. Capt.) B. E. Sutton, Yeo., T.F., Sept. 27th, 1916, substituted for the notification in the "Gazette" of Oct. 27th, 1916.

Equip. Officer, 1st Cl.—Temp. Capt. R. F. Stapleton-Cotton, Gen. List, from the 2nd Cl , Feb. 18th.

Schools of Instn.—Schools of Mil. Aeronautics.—Asst. Comdt. Staff Officer, 2nd Cl.—(Graded for pay as a Brig. Maj.).—Lt. (temp. Capt.) C. S. McNab, Cam'n Highrs., vice Lt. (temp. Capt.) S. W. Smith, R.A., Feb. 22nd.

MEMORANDA.—Temp. Lt. H. C. Lomer from R.N.V.R., to be temp. Capt. for duty with R.F.C., Dec. 26th, 1916.

Actg. Sgt.-Maj. J. C. McNamara from R.F.C., to be Sec. Lt. for duty with R.F.C.; temp. Sec. Lt. A. Roberts resigns his commn., March 23rd.

Cdts. to be temp. Sec. Lts. (on prob.) for duty with R.F.C. :— F. A. Worlidge, L. F. Williams, March 9th.

SPECIAL RESERVE OF OFFICERS. — SUPPLEMENTARY TO REGULAR CORPS.—R.F.C.—MIL. WING.—Sec. Lt. R. G. Fordham relinquishes his commn., March 23rd.

Sec. Lts. (on prob.) confirmed in their rank :—W. S. C. Stephens, G. W. Armstrong, S. V. Green, D. Richardson, R. Waddell, J. B. Thomas.

To be secd. Lts. (on prob.) :—S. B. Stenden, Feb. 1st. C. D. Clarke, H. A. Scott, A. Dobson, T. A. Russell, H. K. Fairbrother, J. R. Sykes, A. L. Freeman, A. E. Rampton, E. P. Spriggs, A. W. B. Medhurst, March 9th. A. L. Thomas, March 12th.

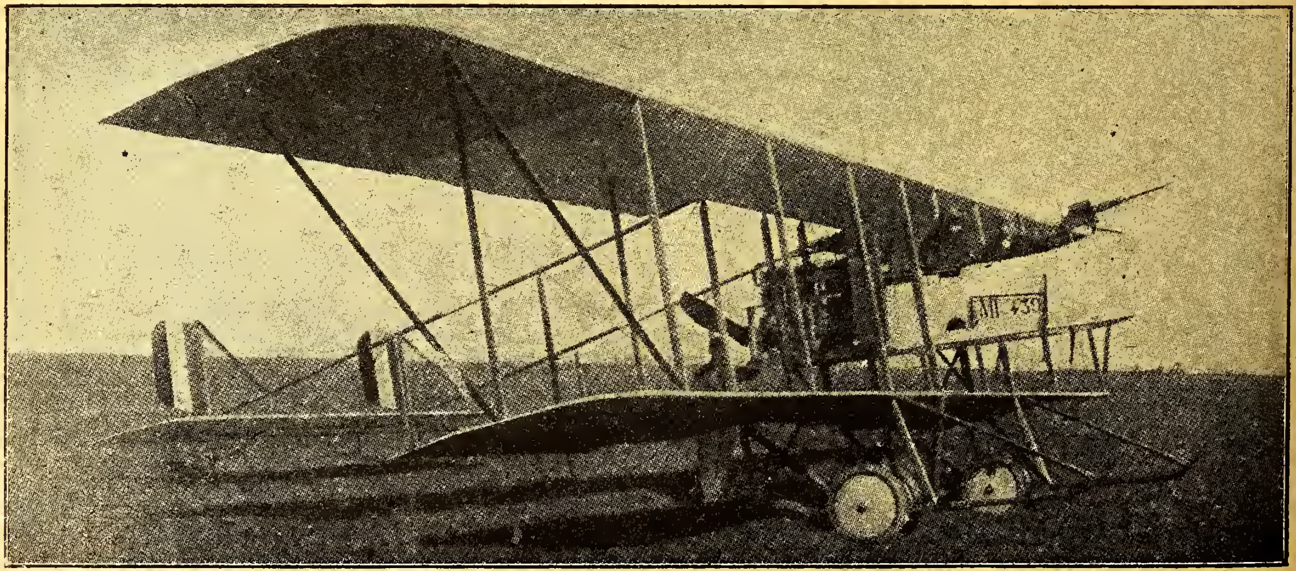
INFANTRY.—GENERAL LIST.—R.F.C.—Temp. Sec. Lt. S. J. Steenekamp resigns his commission, March 23rd, 1917

TERRITORIAL FORCE.—R.E.—Lt. J. R. Wilson is secd. for duty with R.F.C., Sept. 6th, 1916.

INFANTRY.—R. W. SURR. R.—Sec Lt. P. J. Wood is secd. for duty with R.F.C., March 4th. Sec. Lt. E. R. Rudling is secd. for duty with R.F.C., Feb. 28th.

E. KENT R.—Sec. Lt. (temp. Lt.) O. D. Maxted is secd. for duty with R.F.C., Feb. 1st.

WELSH R.—Sec. Lt. G. T. Brown (since accidently killed) to be temp. Lt. whilst serving with the R.F.C., Feb. 1st. Sec. Lt. P. C. Routley to be actg. Lt. whilst serving with the R.F.C., Feb. 1st.



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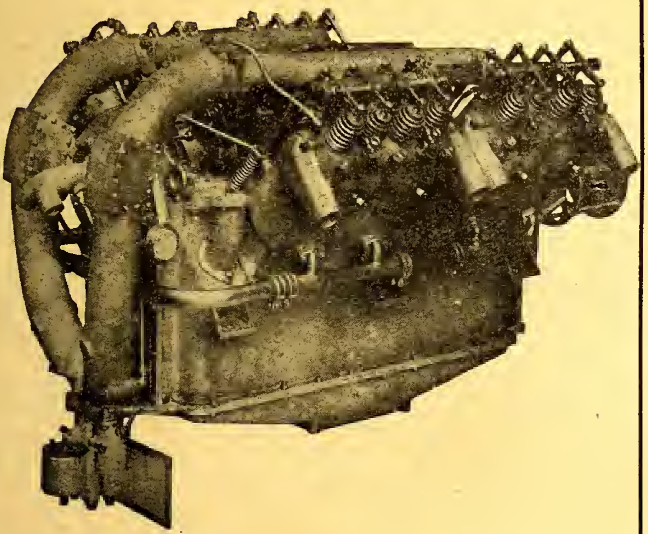

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R. WELSH FUS.—Sec. Lt. H. T. F. Russell is secd. for duty with R.F.C., March 2nd.

R. SUSSEX R.—Sec. Lt. A. J. Brown is secd. for duty with R.F.C., March 3rd.

S. STAFFS R.—Sec. Lt. E. F. Colman is secd. for duty with R.F.C., Feb. 28th.

NOTTS AND DERBY R.—Sec. Lt. J. A. Woods is secd. for duty with R.F.C., Feb. 15th. Sec. Lt. H. I. Newton to be actg. Lt. whilst serving with R.F.C., Feb. 1st.

YORKS L.I.—Sec. Lt. N. C. Denison, to be actg. Lt. whilst serving with R.F.C., Feb. 1st.

MIDD'X R.—Sec. Lt. G. A. Scutt to be actg. Lt. whilst serving with R.F.C., Feb. 1st. Sec. Lt. H. S. Royffe to be actg. Lt. whilst serving with R.F.C., Feb. 1st.

GORD. HIGHRS.—Sec. Lt. J. Mundie to be actg. Lt. whilst serving with R.F.C., Feb. 1st. Sec. Lt. J. M. Sim to be actg. Lt. whilst serving with R.F.C., Feb. 1st.

DURH. L.I.—Sec. Lt. F. A. V. Cook is secd. for duty with R.F.C., Feb. 28th.

ARG. AND SUTH'D HIGHRS.—Sec. Lt. W. Rodger is secd. for duty with R.F.C., Feb. 27th.

CAMBRIDGE R.—Sec. Lt. (temp. Lt.) A. D. Pryor is secd. for duty with R.F.C., March 1st.

LOND. R.—Capt. H. W. Prance is secd. for duty with R.F.C. March 3rd. Sec. Lt. C. G. Brodie to be actg. Lt. whilst serving with the R.F.C., Feb. 1st. Sec. Lt. F. W. Crawford to be secd. for duty with R.F.C., March 4th. Sec. Lt. A. E. Scott to be secd. for duty with R.F.C., March 4th.

* * *

From the "London Gazette," March 23rd, 1917.

ADMIRALTY, March 19th.

R.N.A.S.—Temp. Prob. Flt. Officers to be temp. Flt. Sub-Lts.—A. D. Carey, Nov. 14th, 1916. N. H. Woodhead, Nov. 21st, 1916. J. H. Thompson, Dec. 7th, 1916. M. W. W. Epstein, Dec. 14th, 1916. D. Hammond, Jan. 21st. J. W. Beebee, Feb. 21st. W. Allaway, Feb. 28th.

March 21st.

With reference to the notice which appeared in the "London Gazette" of March 2nd, page 2,120, the seny. of the following Officers should be shown as below, and not as therein stated:—G. H. G. Smyth, Nov. 25th, 1916. E. D. Roach, Aug. 5th, 1916. A. R. Knight, Sept. 26th, 1916. R. B. Freeland, July 25th, 1916.

WAR OFFICE, March 23rd.

REGULAR FORCES. — STAFF. — SPECIAL APPOINTMENT.—Graded for purposes of pay as Staff Lt., 3rd Cl.—Temp. Sec. Lt. P. T. Carden, from R.F.C., Feb. 19th.

ESTABLISHMENTS.—R.F.C.—MIL. WING.—Wing Comdr.—Capt. (temp. Maj.) R. B. Martyn, M.C., Wilts R., from a Sqdn. Comdr., and to be temp. Lt.-Col. whilst so empld., Dec. 31st, 1916.

Flt. Comdr.—Lt. (temp Capt.) S. W. Smith, R.A., from an Asst. Comdt., Feb. 22nd, seny. from Dec. 7th, 1915.

Flying Officers.—Temp. Sec. Lt C. H. Adamson, R. Ir. Fus., and to be transfd. to Gen. List, Feb. 15th. Sec. Lt. C. E. Saunders, Gord. Highrs., T.F. and to be secd.; Sec. Lt. H. T. H. Unwin, Yeo., T.F., and to be secd.; Sec. Lt. D. Coates, Gen. List; temp. Sec. Lt. (on prob.) A. C. Finlayson, Gen. List; temp. Capt. N. Robertson, Norf. R., and to be transfd. to Gen. List; temp. Lt. H. W. Owen, Gen. List; temp. Sec. Lt. W. S. Philcox, Gen. List; temp. Sec. Lt. G. J. E. Smith, Gen. List; temp. Sec. Lt. M. M. Kaizer, Gen. List; Sec. Lt. E. P. Watson, R. W Surr. R., and to be secd.; temp. Sec. Lt. A. J. Chapman, Gen. List, Feb. 28th. Temp. Lt. W. J. Rees, R. W. Fus., and to be transfd. to Gen. List; temp. Sec. Lt. T. C. Thomson, attd. R.W. Kent R., and to be transfd. to Gen. List; Sec. Lt. G. L. Percy, Lan. Fus., Spec. Res., and to be secd.; temp. Lt. D. M. Goodyear, Gen. List; temp. Sec. Lt. G. M. Lewis, R. W. Surr. R., and to be transfd. to Gen. List, March 1st. Temp Sec. Lt. J. Ferguson, Gen. List; Sec. Lt. F. Sadler, Durh. L.I., T.F., and to be secd., March 2nd. Sec. Lt. B. E. Edwards, Lan. Fus., T.F., and to be secd.; Sec. Lt. (on prob.) W. B. Wood, Hamps. R., T.F., and to be secd., March 3rd. Temp. Sec. Lt. W. Woodward, Gen. List; temp. Sec. Lt. A. B. Cort, Gen. List, Mar. 7th.

The seniority of temp. Sec. Lt. (temp. Lt.) J. L. M. de C. Hughes-Chamberlain, Gen. List is Dec. 14th, 1915, and not as stated in the "Gazette" of Oct. 7th, 1916.

The seniority of temp. Sec. Lt. R. A. Walmisley, Gen. List is Feb. 25th, 1916, and not as stated in the "Gazette" of March 9th.

Equipment Officers, 2nd Cl.—Sec. Lt. (on prob.) (temp. Hon. Lt.) A. B. D. Lang, Spec. Res., relinquishes his temp. hon. rank, and to be temp. Lt. whilst so empld., Feb. 12th. Capt. H. W. Prance, Lond. R., T.F., and to be secd., March 3rd. 3rd Cl.—Sec. Lt. (on prob.) A. W. Chapman, Spec. Res., Dec. 27th, 1916. Sec. Lt. P. M. Thesiger, Yeo., T.F., and to be secd., Feb. 1st. Sec. Lt. (on prob.) H. Fuller-Clark, Spec. Res., Feb. 2nd Sec. Lt. R. Waddell, Spec. Res., Feb. 18th. Temp. Sec. Lt. (on prob.) A. A. M. Weir, Gen. List, Feb. 23rd. Temp. Lt. C. H. Tancred, Gen. List, from a Flying Officer, Feb. 28th. Temp. Sec. Lt. B. W. A. Greenhough, M.C., Shrops. L.I., and to be transfd. to Gen. List, March 1st. Sec. Lt. D. Richardson, Spec. Res., March 3rd.

INFANTRY.—GLOUC. R.—Temp. Sec. Lt. R. A. Phipps, from Gen. List, R.F.C., to be temp. Sec. Lt., attd., March 24th, but with seny. from Aug. 5th, 1916.

MEMORANDA.—Sub-Lt. H. W. Owen, from R.N.V.R., to be temp. Lt. for duty with R.F.C., Feb. 28th.

Lt. F. S. Thomas, from R.N.V.R., to be temp. Sec. Lt. (on prob.) for duty with R.F.C., March 15th.

SPECIAL RESERVE OF OFFICERS.—RESERVE UNITS.—INFANTRY.—GORD. HIGHRS.—Sec. Lt. E. E. Hardie relinquishes his commn. on appt. to a commn. in the R.N.A.S., March 18th.

TERRITORIAL FORCE.—INFANTRY.—NORTH'D FUS.—Sec. Lt. R. B. Davies is secd. for duty with the R.F.C., Mar. 8th.

YORKS R.—Lt. T. G. Thornton is secd. for duty with the R.F.C., Feb. 28th.

LANCS. FUS.—Lt. W. H. Williams is secd for duty with the R.F.C., Feb. 5th.

CHES. R.—Sec. Lt. C. Reece is secd. for duty with the R.F.C., Mar. 9th.

E. LANC. R.—Capt. W. Adams is secd. for duty with Notts. and Derby R., Mar. 2nd.

WELSH R.—Sec. Lt. R. L. Thomas is secd. for duty with the R.F.C., Feb. 17th.

ESSEX R.—Lt. S. W. Williams is secd. for duty with the R.F.C., Feb. 28th.

R. W. KENT R.—Sec. Lt. (temp. Lt.) M. Campbell is secd. for duty with the R.F.C., Feb. 27th.

DURH. L.I.—Sec Lt. F. Sadler is secd. for duty with the R.F.C., Mar. 2nd.

GORD. HIGHRS.—Sec. Lt. C. E. Saunders is secd. for duty with the R.F.C., Feb. 28th. Sec. Lt. A. G. Davidson is secd. for duty with the R.F.C., Feb. 26th. Sec. Lt. W. K. Mercer is secd. for duty with the R.F.C., Mar. 7th.

LOND. R.—Sec. Lt. T. W. Sclater is secd. for duty with the R.F.C., Mar. 8th. Sec. Lt. D. W. Lamb is secd. for duty with the R.F.C., Feb. 21st. Sec. Lt. (temp. Lt.) C. B. Waters is secd. for duty with the R.F.C., Feb. 21st. Lt. E. F. Ambler is secd. for duty with the R.F.C., Feb. 22nd.

HERFFORD R.—Sec. Lt. G. B. McMichael is secd. for duty with the R.F.C., Feb. 26th.

LOND. R.—Sec. Lt. (temp. Lt.) G. F. Bishop to be Sec. Lt. (Actg. Lt.) whilst empld. with the R.F.C., Mar. 24th.

* * *

From the "London Gazette" Supplement, March 23rd, 1917.

ADMIRALTY, March 23rd.

The following Decorations have been conferred by the Allied Powers on officers of the British Naval Force for distinguished services rendered during the war:—

DECORATIONS CONFERRED BY THE PRESIDENT OF THE FRENCH REPUBLIC.

CROIX DE GUERRE.

Comdr. Henry C. Halahan, D.S.O., R.N.
Wing Comdr. Richard B. Davies, V.C., D.S.O., R.N.
Sqdn. Comdr. Francis K. Haskins, D.S.C., R.N.
Lt. Denys C. G. Shoppee, D.S.C., R.N.
Lt. Viscount Maidstone, R.N.V.R.

DECORATION CONFERRED BY THE KING OF ITALY.

ORDER OF ST. MAURICE AND ST. LAZARUS.

GRAND OFFICER.—Rear-Admiral Mark E. F. Kerr, C.B., M.V.O.

DECORATION CONFERRED BY THE KING OF THE BELGIANS.

ORDER OF LEOPOLD.

CHEVALIER.—Act. Flt. Cmdr. Charles C. R. Edwards, R.N.A.S.

The King has given unrestricted permission to the officers concerned to wear the Decorations in question.

* * *

From the "London Gazette" Supplement, March 24th, 1917.

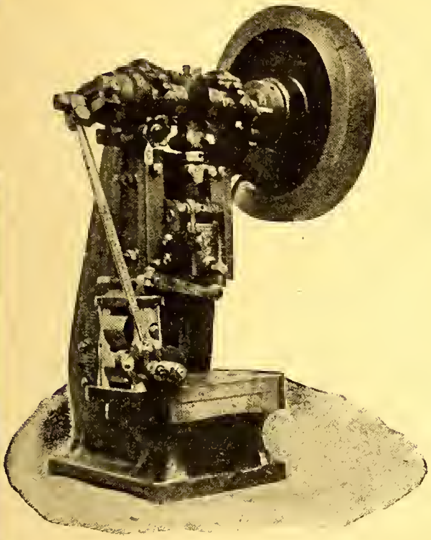
WAR OFFICE, March 24th.

REGULAR FORCES.—STAFF.—ATTD. TO HDQR. UNITS.—Draft Conducting Officer.—Graded for pay as Staff Lt., 2nd Cl.—Temp. Sec. Lt. F. Crisp, from R.F.C., Feb. 13th.

ESTABLISHMENTS. — R.F.C. — MIL. WING. — Sqdn. Comdrs.—From Flt. Comdrs., and to be temp. Majs. whilst so empld.:—Lt. (temp. Capt.) A. J. L. Scott, Suss. Yeo., T.F., March 6th. Capt. A. G. Moore, M.C., Manch. R., Spec. Res., March 23rd.

Flt. Comdrs.—Maj. A. S. W. Dore, Worc. R., T.F., from a Flying Officer, March 6th. From Flying Officers, and to be temp. Capts. whilst so empld.:—Sec. Lt. (temp. Lt.) W. S. Caster, Cyclist Bn., T.F., March 13th. Lt. P. F. J. Kent, D. Gds., March 18th.

Flying Officers.—Temp. Capt. H. C. Lomer, Gen. List, Dec. 26th, 1916. Temp. Lt. H. R. Clarke, A.S.C., and to be transfd. to Gen. List, March 1st. Temp. Lt. R. H. Sharp, attd. Worc. R., and to be transfd. to Gen. List; temp. Sec. Lt. W. R. Fish, Suff. R., and to be transfd. to Gen. List, March 3rd. Temp. Lt. D. C. Telford, R.E.; Sec. Lt. A. E. Scott, Lond. R., T.F., and to be secd.; Sec. Lt. P. J. Wood, R. W. Surr. R., T.F., and to be secd.; Sec. Lt. F. W. Crawford, Lond. R., T.F., and to be secd., March 4th. The seniority of Sec. Lt. (temp. Lt.) A. W. Smith, L'pool R., T.F., is Jan. 22nd, 1916, and not as stated



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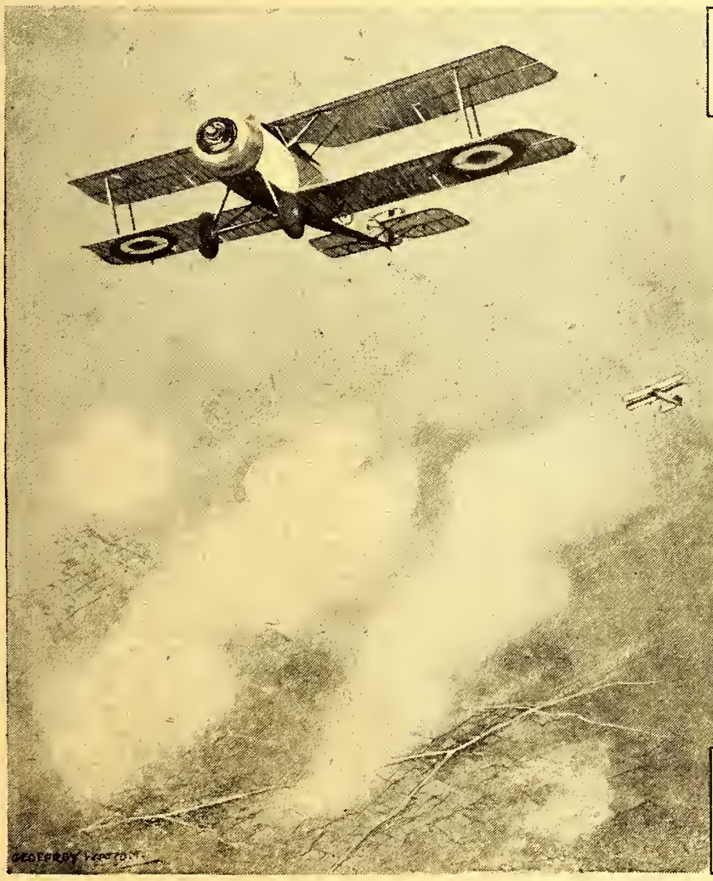

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in "Gazette" of March 3rd; the seniority of temp. Sec. Lt. W. G. Barker, M.C., Gen. List, is April 7th, 1916, and not as stated in "Gazette" of March 6th.

Park Comdr.—Qrmr. and Hon. Lt. (temp. Capt.) W. J. D. Pryce, R.F.C., from an Equipment Officer, 1st Cl., and to be temp. Maj. whilst so empld., Feb. 2nd.

Equipment Officer, 3rd Cl.—Temp. Sec. Lt. A. Pollock, Gen. List, March 10th.

Infantry.—Lan. Fus.—Temp. Sec. Lt. C. S. Atkinson, from Gen. List, R.F.C., to be temp. Sec. Lt. (attd.), March 25th, with seny. from Sept. 26th, 1916.

Memoranda.—To be temp. Sec. Lts. (on prob.)—J. G. Barron, for duty with R.F.C., March 6th.

Sgt. H. E. Went, from R.F.C., for duty with the Mil. Wing of that Corps, March 10th.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Mil. Wing.—Sec. Lt. (on prob.) J. D. English resigns his commn., March 25th.

* * *

From the "London Gazette" Supplement, March 26th, 1917.

War Office, March 26th.

REGULAR FORCES—Establishments.—R.F.C.—Mil. Wing.—Sqdn. Comdr.—Capt. (temp. Maj.) T. G. Hetherington, Hrs., from a Sqdn. Comdr., R.N.A.S., and to retain his temp. rank whilst so empld., Feb. 22nd, with seny. from May 27th, 1915.

Flt. Comdrs.—Lt. (temp. Maj.) A. C. Wright, Spec. Res., to revert from Sqdn. Comdr. to Flt. Comdr., to relinquish his temp. rank, and to be temp. Capt whilst so empld., March 8th, with seny. from Nov. 13th, 1915. From Flying Officers and to be temp. Capts. whilst so empld.:—Lt. F. Billinge, Manch. R., Spec. Res., March 11th. Lt. A. F. Baker, D. of Corn. L.I., Spec. Res., March 12th. Temp. Sec. Lt. F. T. Courtney, Gen. List, March 14th. Sec. Lt. F. L. J. Shirley, York. R., Mar. 15th.

Flying Officers.—Sec. Lt. (temp. Lt.) F. A. Bates, Yeo., T.F., and to be secd., Feb. 13th. Temp. Sec. Lt. (on prob.) C. P. Williams, Gen. List; Sec. Lt. D. C. Birch, North'n R., and to be secd., Feb. 27th. Sec. Lt. E. R. Rudling, R. W. Surr. R., T.F., and to be secd., Feb. 28th; Lt. J. H. Brink, R.F.A., Spec. Res., March 1st. Lt. H. T. F. Russell, R. W. Fus., T.F., and to be secd.; Sec. Lt. G. W. Kempster, Midd'x R., and to be secd., March 2nd. Sec. Lt. (temp. Lt.) H. C. Cutler, Yeo., T.F., and to be secd.; Sec. Lt. (on prob.) A. J. Brown, R. Suss. R., T.F., from K. R. Rif. C., and to be secd.; Sec. Lt. J. D. Payne, Gen. List, March 3rd.

The date of the appt. of Capt. G. E. F. Sutton, M.C., Canadian Inf. Bn., is Feb. 15th, with seny. from Jan. 19th, 1916, and not as stated in the "Gazette" of March 8th.

The date of seny. of Lt. G. W. Devenish, R.A., is April 20th, 1916, and not as in "Gazette" of Nov. 14th, 1916.

The date of seny. of Lt. K. MacKenzie, Sea. Highrs., Spec. Res., is April 15th, 1916, and not as stated in "Gazette" of Jan. 19th.

The date of seny. of Sec. Lt. C. Turner, Worc. R., is Feb. 22nd, 1916, and not as stated in "Gazette" of Feb. 21st.

Lt. (now temp. Maj.) C. Hirtzel, Spec. Res., and to be temp. Capt. whilst so empld., from Jan. 17th to 31st.

Equipment Officers, 1st Cl.—Temp. Sec. Lt. H. Cumming, Gen. List, from a Staff Lt., and to be temp. Capt. whilst so empld.; temp. Capt. J. Romanes, Bord R., and to be transfd. to Gen. List; temp. Lt. G. E. Stagg, Gen. List, from a Staff Lt., and to be temp. Capt. whilst so empld.; Lt. (temp. Capt.) G. Dugdale, Yeo., T.F., from a Staff Lt., and to retain his temp. rank whilst so empld.; Sec. Lt. N. Martin, Spec. Res., from 3rd Cl., and to be temp. Capt. whilst so empld., March 8th.

2nd Cl.—Sec. Lt. D. W. Wilson, Spec. Res., from the 3rd Cl., and to be temp. Lt. whilst so empld.; Sec. Lt. (temp. Capt.) P. C. A. Bridgeman, A.S.C., T.F., to retain his temp. rank whilst so empld., and to be secd.; temp. Capt. P. E. Tickler, North'd Fusiliers., and to be transfd. to Gen. List. From the 3rd Cl.—Sec. Lt. P. Adams, Spec. Res., and to be temp. Lt. whilst so empld.; Sec. Lt. (temp. Lt.) D Hodgson, Cyclist Bn., T.F., and to retain his temp. rank whilst so empld.; Sec. Lt. (on prob.) A. W. Chapman, Spec. Res., and to be temp. Lt. whilst so empld.; Qrmr. and Hon. Lt D. McBirney, R.F.C., and to be temp. Lt. whilst so empld., March 8th.

3rd Cl.—Sec. Lt. D. L. Abbott, Lond. R., T.F., and to be secd.; temp. Sec. Lt. J. G. Spencer, E. Kent R., and to be transfd. to Gen. List, March 8th. Sec. Lt. (on prob.) W. T. Hanson, Spec. Res., March 12th.

Gen. List (R.F.C.).—Cdts. to be temp. Sec. Lts. (on prob.):—W. L. Culverwell, K. I. Goodman, Nov. 11th, 1916. R. B. Perring, Nov. 13th, 1916. L. Quartermain, Jan. 2nd. A. Christian, Feb 1st. F. E. Leach, Feb. 19th. G. J. E. Agnew; A. E. C. Y. Bramble; J. E. Blackeby; A. G. Bullock; H. W. Bower; A. T. Belton; G. H. Brown; F. W. J. Collier; H. R. P. Collett; J. Drew; R. A. Fleck; F. C. Harrison; L. H. S. Harben; E. B. Keele; R. H. Loosemore; W. H. Martin; J. E. Morgan; C. H. O. Stanton; W. T. Samuel, Feb. 28th. G. D. Williamson; H. C. Beeby, March 2nd. C. A. Stiles, March 8th. Temp. Sec. Lt. H. C. Hopkinson resigns his commission to resume medical studies, and is granted hon rank of Sec. Lt., March 27th.

Memorandum.—Sub-Lt. M. J. Thurston, from R.N.V.R., to be temp. Lt. for duty with R.F.C., March 2nd.

SPECIAL RESERVE OF OFFICERS.—Supplementary to Regular Corps.—R.F.C.—Mil. Wing.—Sec Lt. (on prob.) T. L. Baylis resigns his commission, March 27th.

TERRITORIAL FORCE.—R.F.C.—Capt. J. E. Pearce to be temp. Major, Feb. 1st.

Infantry.—R. Scots.—Lt. (temp. Capt) G. H. Green is secd. for duty with R.F.C., Feb. 12th.

S. Staffordshire R.—Capt. H. A. Page is secd. for duty with R.F.C., Feb. 25th.

Sea. Highrs.—Lt. (temp. Capt.) A. H. C. Hope is secd. for duty with R.F.C., Feb. 21st.

* * *

War Office, March 26th.

The King has been pleased to confer the Military Cross on the following Officers in recognition of their gallantry and devotion to duty in the field:—

Temp. Sec. Lt. John William Aldred, R. Lanc. R. and R.F.C.

During an aerial combat with two hostile scouts, he drove one of the hostile machines down and succeeded in driving the other hostile machine back over the enemy's lines. He displayed great courage and determination throughout.

Lt. Douglas Hugh Moffatt Carbery, R.F.A. and R.F.C.

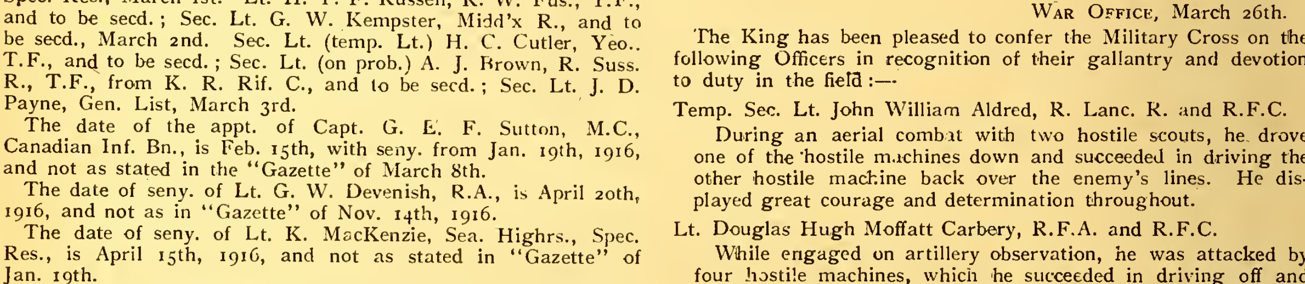
While engaged on artillery observation, he was attacked by four hostile machines, which he succeeded in driving off and continued to carry out his observations. Later, he was again attacked by several hostile machines and succeeded in bringing one of them down. He has previously done fine work

Lt. (temp. Capt.) Hubert William Godfrey Jones, Welsh R. and R.F.C.

With a patrol of three scouts he attacked a hostile formation of 10 enemy machines. Although wounded, he continued the combat and drove down an enemy machine. Later, although again wounded, he remained with his patrol until the enemy retired.

Sec. Lt. Wilfrid Rippon Snow, R.F.C., Spec. Res.

He successfully bombed a hostile aerodrome from a height of 1,000 ft. Later, in another machine, he again bombed the hostile aerodrome from a low altitude On another occasion he made two very daring trench reconnaissances.



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A three-quarter rear view of the Savoia-Farman biplane illustrated on page 810.

Another "repair" repaired

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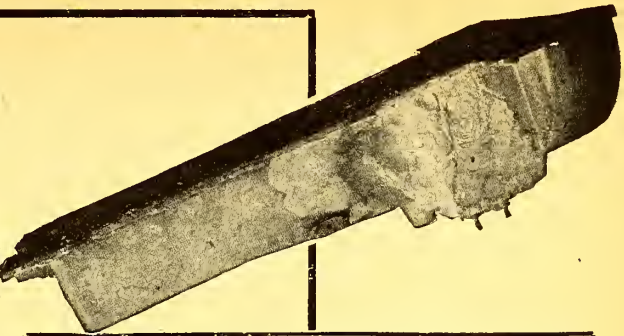

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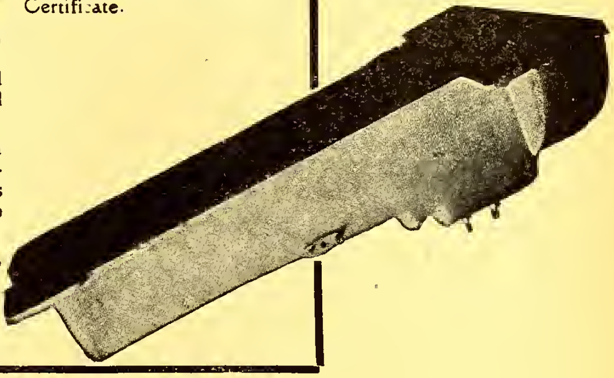

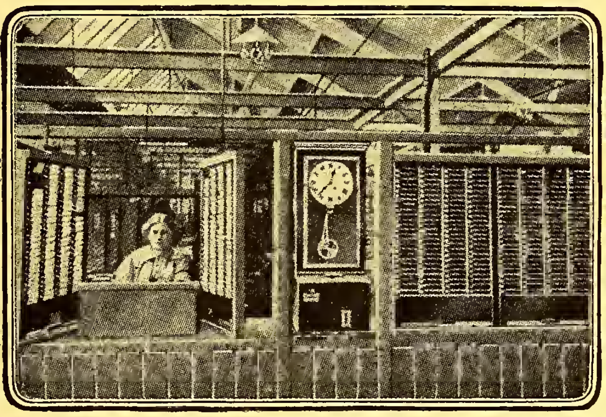

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The King has been pleased to approve of the award of the Distinguished Conduct Medal to the following Non-Commissioned Officer for acts of gallantry and devotion to duty in the field :—

23921 Sgt. H. G. Smith, R.F.C.

The King has been graciously pleased to award the Military Medal for bravery in the field to the undermentioned Non-Commissioned Officer :—

320 L.-Cpl. R. A. Cartledge, R.F.C.

FROM THE COURT CIRCULAR.

Buckingham Palace, March 21st.

The following Officers had the honour of being received by the King, when His Majesty conferred decorations as follows :—

The Military Cross.

Capt. Frederick Sutton, Canadian Infantry, attached R.F.C.
Lt. Charles Workman, Scottish Rifles and R.F.C.

* * *

Buckingham Palace, March 24th.

The following officers had the honour of being received by the King this morning, when His Majesty conferred decorations as follows :—

The Distinguished Service Cross and Bar.

Flight Lieut. David Galbraith, R.N.A.S

The Military Cross.

Lieut.-Col. Edgar Ludlow-Hewitt, Royal Irish Rifles, attd. R.F.C.
Capt. Thomas Scott, R.F.C.
Lieut. Labouchere Bainbridge-Bell. Royal Munster Fusiliers, attd. R.F.C.
Lieut. Ernest Hicks, R.F.C.
Lieut. Ernest Payne, R.F.C.
Sec. Lieut. Frederick Fyfe, R.F.C.

NAVAL.

The following appointments have been made in the Royal Naval Air Service :—

March 21st.—The following Proby. Flt. Officers (temp.) have been promoted to Flt. Sub-Lts. (temp.), seny. as stated :—A. D. Carey, Nov. 14th, 1916; N. H. Woodhead, Nov. 21st; J. H. Thompson, Dec. 7th; M. W. W. Eppstein, Dec. 14th; D. Hammond, Jan. 21st; J. W. Beebee, Feb. 21st; and W. Allaway, Feb. 28th.

Sub-Lt. (temp. R.N.V.R.).—A. D. Newbury, promoted to Lt. (temp.), seny. March 20th.

Proby. Flt Sub-Lts. (temp.).—R. McDonald and S. H. McCradden, both confirmed in rank, with seny. of Sept. 15th and 17th, 1916, respectively.

The following Flt. Sub-Lts. (temp.) have been confirmed in rank with original seny. :—A. H. Munday, J. A. Piquet, E. A. Power, P. H. Martin, H. A. Mumford, R. F. Dickey, P. Brend, C. Boumphrey, E. A. Bolton, E. G. F. Thompson, W. Buckley, C. R. W. Hodges, G. G. Bowman, N. Black, F. Hall, G. Hemming, W. A. Scott, J. S. Smith, A. G. Bishop, O. B. Ellis, K. Ogden, A. C. Reid, P. Johnson, H. H. Booth, D. M. Shields, C. W. Bailey, A. E. Ouzner, C. J. Clayton, and F. T. Fergie.

Temp. commissions (R.N.V.R.) have been granted to the following, seny. as stated :—Lts.—F. C. Lea, March 17th; and S. E. Bowyer, March 20th. Sub-Lts.—J. H. Narbert and A. E. Reed, March 19th.

March 22nd.—The following temp. entries (R.N.V.R.) have been made :—Lieut.—L. A. C. Stafford, seny. March 19th. Sub-Lieut.—C. Hayes, seny. March 21st, and both apptd. to "President," addl., for R.N.A.S.

Mr. B. A. Woods granted a temp. commission as Sub-Lt. (R.N.V.R.), seny. March 3rd, and apptd. to "President," addl., for R.N.A.S.

March 25th.—Messrs. N. F. W. Paul and R. Davidson both granted temp. commissions as Lt. (R.N.V.R.) and Sub-Lt. (R.N.V.R.) respectively, seny. March 23rd.

Mid., R.N., H. Viney granted a temp. commission as Sub-Lt., R.N.V.R., and appointed to the "President," additional, for R.N.A.S., to date April 1st.

Clerk, R.N., A. C. Getley graded in R.N.A.S. as temp. prob. Flight Officer, to date March 23rd.

The Casualty List.

Reported March 21st.

Drowned.—Rawson, E. A. A., Ldg. Mech., F.8484.

Missing, believed Drowned.—Gorman, R. E., Air Mech., 2nd Gde., F.11693.

PERSONAL NOTICES.

Deaths.

HARVEY.—An inquest was held at Angmering (Sussex), on March 26th, on the body of Flt. Sub-Lt. Arthur Francis Harvey, aged 18, a native of Wallasey. The officer was making a cross-country flight preparatory to receiving his pilot's certificate, and was passing over Angmering on March 24th. Suddenly, his machine was seen to turn sharply to the right when it side-slipped and nose-dived to the ground from a height of about 60 feet. The opinion was expressed that the accident was due to an error of judgment on the part of Sub-Lt. Harvey when attempting a landing. A verdict of accidental death was returned.

* * *

OLIVER.—At the inquest on March 26th on the body of Flt. Lt William Smith Oliver, R.N., who was killed whilst flying in Kent, it was stated that the machine fell about 2,500 ft., and that when it emerged from a cloud it was nose-diving. The wings on one side then fell away, and the aeroplane crashed to earth. Lt. Oliver was a Canadian, and was said to have seen active service in France. A verdict of death by misadventure was returned.

* * *

SPIERS.—Charles Henry Stephen Spiers, R.N.A.S., who died on March 16th of acute appendicitis at North Ormesby Hospital, Middlesbrough, was the only son of Mr. and Mrs. Spiers, Keston Lodge, 15, St. Saviour's Road, Brixton Hill, S.W. He was 29 years of age. The funeral service took place at St. Saviour's Church, Brixton Hill, on Friday, March 23rd.

* * *

A requiem Mass was held on Friday, March 23rd, at St. Mark's, Hamilton Terrace, N.W., for Flt. Sub-Lieut. F. C. Walker, R.N., whose death was announced last week.

Birth.

DALGLEISH.—Mrs. Ogilvy Dalgleish, wife of Squadron Commander James Ogilvy Dalgleish, R.N., and youngest daughter of Myles Kennedy, of Stone Cross, Ulverstone, gave birth to a daughter at Gilmerton, Drem, Scotland, on the 21st inst.

MILITARY.

G.H.Q. Communiqués.

March 20th, 9.5 p.m.—Bombs were dropped yesterday by our aeroplanes with good results on an important enemy ammunition depot.

In air fights one German machine was brought down in flames, and two others were driven down completely out of control.

Three of our aeroplanes are missing, two of which are known to have been brought down by hostile anti-aircraft guns

March 22nd, 8.47.—Our aeroplanes were active again yesterday in the area of the enemy's withdrawal and much valuable reconnaissance work was carried out. One German machine was brought down behind our lines.

March 25th, 8.50 p.m.—There was considerable activity in the air yesterday by both sides. Two important railway junctions behind the enemy's lines were bombed by our aeroplanes and a number of fights took place, in the course of which eight hostile machines were driven down out of control. Four of our machines are missing.

March 26th, 8.35 p.m.—There was much fighting in the air yesterday, in the course of which two German machines were brought down and three others driven down damaged.

Seven of our machines are missing.

War Office Communiqués.

The General Officer commanding the British Forces in Macedonia reports :—

March 24th.—Our aircraft have made many bombing attacks on enemy concentrations and communications, and during the week have accounted for four enemy machines.

The Army Council has issued an order that all officers in the Flying Corps must after April 15th wear the regulation double-breasted Flying Corps tunic. At the present time many are wearing a military tunic not in accord with the regulations.

[One learns that the order does not apply to field officers. Presumably the assumption is that a field officer is somewhere on the wrong side of forty, and past the prime of life, so that he is less likely to be interesting in his personal appearance than the younger members of the Corps.—Ed.]

The Casualty List.

Reported March 21st.

Previously reported Missing, now reported Killed.—Graves, Major E. P., R.F.A., attd. R.F.C.

Missing, believed Killed.—Glasson, Sec. Lt. D. H., R.F.C.

Previously reported Missing, now reported Missing, believed Prisoner in Bulgarian Hands.—Stopher, Sec. Lt. A. C., R. Welsh Fus., attd. R.F.C.

Wounded.—R.F.C.—Baker, 14394 2nd Cl. Air Mech. E. (East Ham, E.).

Reported March 22nd.

Previously reported Missing, Believed Prisoner, now reported Prisoner in Turkish Hands.—Lazarus-Barlow, Lt. A. J., Yeomanry and R.F.C.

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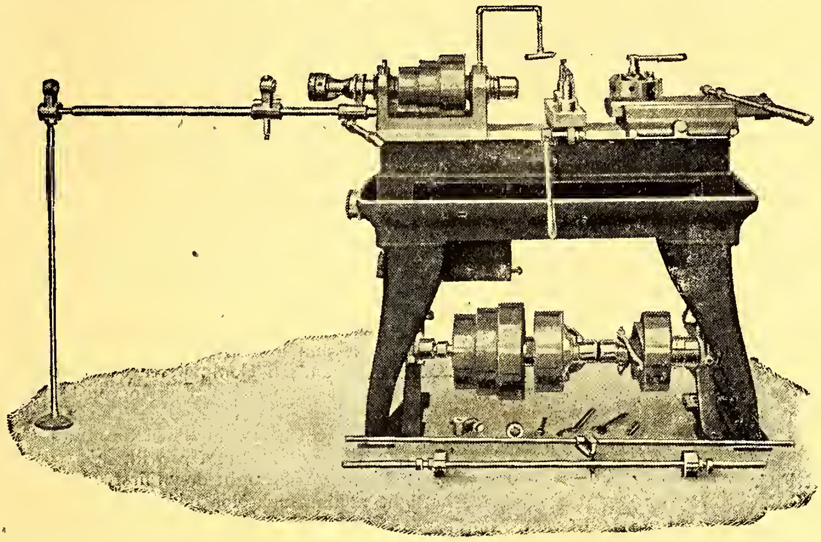

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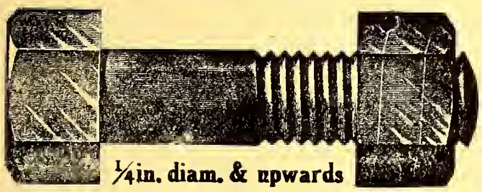

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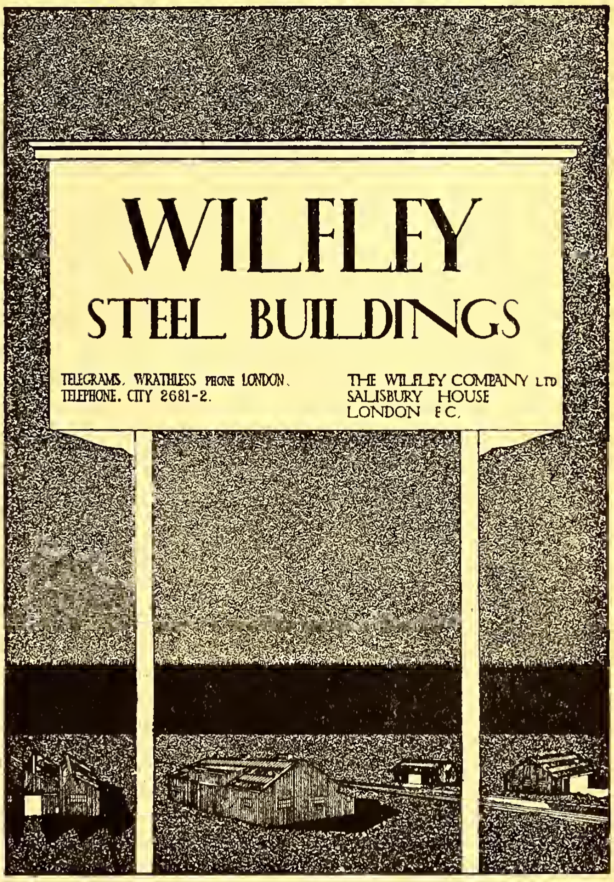

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Reported March 23rd.

Previously reported Missing, now reported Killed.—Bowman, Sec. Lt. W. P., R. W. Kent Regt., attd. R.F.C.

Wounded.—O'Brien, Lt. A. S. H., R.F.A., attd. R.F.C.

Missing.—Lindley, Sec. Lt. E. W., Manchester Regt. and R.F.C.

Previously reported Prisoner, now reported Wounded and Prisoner in German Hands.—Mitchell. Sec. Lt. H. B. O., R. Inniskilling Fus., attd. R.F.C.

Reported March 24th.

Killed.—Fowler, Sec. Lt. D. D., R.F.C.

Muirhead. Sec. Lt. J., R.F.C.

Wenden, Capt. G., Border Regt., attd. R.F.C.

Previously reported Missing, now reported Killed.—Firbank. Sec. Lt. G. B. J., R.F.C.

Parker, Maj. L., R.F.C.

Wounded.—Matheson, Sec. Lt. W. D., R.F.C.

Munro, Sec. Lt. R. N. L., R.F.C.

Reported March 26th.

Killed.—Bourne, Sec. Lt. G. H. T., King's R. Rifle Corps, attd. R.F.C.

Pashley, Sec. Lt. E. C., R.F.C.

Thwaytes, Sec. Lt. J., Border Regt., attd. R.F.C.

Died of Wounds.—Miller, Sec. Lt. R. G., Argyll and Sutherland Highrs., attd. R.F.C.

Wounded.—Colson, Sec. Lt. N. H., R.F.C.

Cooch, Lt. T. A., R.F.C.

Cox, Sec. Lt. R. G., Worcestershire Regt., attd. R.F.C.

Davy, Lt. P. H., R.F.C.

Holland, Capt. C., R.F.C.

Hudson, Sec. Lt. F. R., R.F.C.

Parnell, Sec. Lt. I. W., R.F.C.

Ward, Sec. Lt. H. E., R.F.C.

Missing.—Boultbee, Lt. A. E., Northampton Regt., attd. R.F.C.

Constable, Sec. Lt. A. L., R.F.C.

Cross, Sec. Lt. R. W., R.F.C.

Gilson, Sec. Lt. A. J., R.F.C.

Harryman, Sec. Lt. S., Gloucester Regt., attd. R.F.C.

Knox, Sec. Lt. C. D., Suffolk Regt., attd. R.F.C.

Lownds, Sec. Lt. R. H., R.F.C.

Lodge, Lt. C. F., Worcester Regt. and R.F.C.

Rimer, Sec. Lt. J. C., R.F.C.

Thorne, Capt. G. S., R.F.C.

OVERSEA FORCES.

Killed.—Murray, Lt. A. A., Canadian Inf., attd. R.F.C.

Died of Wounds.—Morris, Lt. B. M., Canadian Engrs., attd. R.F.C.

Wounded.—Guillon, Lt. S., Canadian Inf., attd. R.F.C.

Wounded.—R.F.C.—Bond, 7653 1st Cl. Air Mech. W. H. (Chipping Norton).

Reported March 27th.

Previously reported Wounded and Missing, now reported Killed.—Flinn, Sec. Lt. E. W., R.F.C.

Previously reported Missing, now reported Killed.—Vernon, Sec. Lt. L. G. H., M.C., R.F.C.

Wounded.—Allen, Lt. R. C., R.F.A. and R.F.C.

Farmer, Sec. Lt. B., E. Kent. R., attached R.F.C.

Missing.—Appleton, Sec. Lt. A., R.F.A. and R.F.C.

Bowyer-Bower, Capt. E. W., E. Surr. Regt., attd. R.F.C.

Dougall, Sec. Lt. C. R., Argyll and Sutherland Highrs. and R.F.C.

Jay, Sec. Lt. T. W., R.F.C.

Van Baerle, Sec. Lt. P. E. H., W. Yorks. Regt. and R.F.C.

Wilson, Sec. Lt. F. H., R.F.C.

Previously reported Missing, now reported Prisoner in German Hands.—Greig, Capt. O., R.F.C.

Missing.—R.F.C.—Ridgway, 61603 2nd Cl. Air Mech. F. J. (Manchester).

PERSONAL NOTICES.

Deaths.

ALLEN.—The Ipswich Borough Coroner held an inquest at the hospital on March 24th on the body of Lt. Melville R. H. Allen, of the R.F.C., whose parents reside at Bedford, and who died in the hospital on March 21st as the result of injuries received in an accident to an aeroplane. Mr. Allen, who was 25 years of age, had been in the R.F.C. for about two years. He was a very experienced pilot, and on March 21st, when about 150 ft. up, the engine suddenly failed. He then lost his flying speed, and the machine fell to the ground. Mr. Allen was pinned beneath the wreckage, and was removed to the hospital, where he died from the injuries received.

Capt. Tizard said he believed the stoppage was due either to too much or too little petrol. The machine was in good order when tested by the officer prior to ascending. The jury returned a verdict of accidental death, and expressed regret at the loss of such a brilliant young officer.

* * *

BOITEUX-BUCHANAN.—Clifford William Boiteux-Buchanan, Observer, R.F.C., who was killed in an air fight on March 16th, was the eldest son of Mr. and Mrs. William Buchanan, of Stockwell, S.W.

Mr. Buchanan will be remembered by many of the older hands in aviation as being a volunteer assistant with M Paulhan in his earliest flights in this country, when he earned the nick-name of "Paulhan's Mascot." Later on he was associated with the late Mr. W. B. Rhodes-Moorhouse. At the beginning of the war he joined the A.S.C., and saw a great deal of service. Later on he transferred to the R.F.C. He was a thorough little sportsman, and a keen mechanic, who loved his work, whether on aeroplanes or motors, for its own sake, and he will be deeply regretted by all who knew him.

* * *

BOUIE.—Sec. Lt. Jean Andre Auguste Bouie, R.F.C., died on March 24th from injuries received in an aeroplane accident in Yorkshire. He was a son of Jules Bouie, of Mauritius, and before joining the Flying Corps was a fourth-year medical student at Guy's Hospital, London.

* * *

BOWDEN.—Sec. Lt. H. G. C. Bowden, R.F.C. (killed in action on March 11th), was 20 years of age, and the son of Mr. and Mrs. G. H. Bowden, Sunningdale, Reigate. He was educated at Cranleigh School. He represented his school at Bisley for the Ashburton Challenge Shield in 1913 and 1914, and in the latter year won the Surrey Rifle Association's Silver Medal offered for the best shot among Surrey cadets.

His Squadron Commander wrote to Mr. Bowden: "I am sure it will be some consolation to you to know that your son died a very gallant aviator's death. The pilot who was flying the other machine which accompanied him was Capt. the Hon. E. P. F. Lubbock, who, together with his observer, was killed. Capt. Lubbock was brought down first, and your son put up a very brave fight against superior odds until he was also brought down."

* * *

HILLEBRANDT.—A verdict of "Accidental death" was returned at an inquest in Kent on March 22nd on Sec. Lt. Frederick Edmund Hillebrandt, R.F.C., who died that morning as the result of injuries caused by a flying accident.

* * *

HOSKINS.—Sec. Lt. George Chandos Hoskins, General List and R.F.C., was the only son of George T. and Mrs. Hoskins, of Windermere, Wellfield Avenue, Muswell Hill, and formerly of Winchmore Hill, N. He was educated at the Merchant Taylors' School, and was a keen athlete. He served his apprenticeship to the Merchant Taylors' Company, and obtained the Freedom of the City of London. He offered his services before war was finally declared, and joined the H.A.C. on Aug. 4th, 1914.

He went to Egypt, where he obtained his commission, and was afterwards attached to the Manchester Regiment. In June, 1916, he was transferred to the R.F.C., and was ordered to England to train as a pilot. He soon obtained his wings, and was sent to the front, where he was killed on March 11th, aged 24. His C.O. writes:—"Your son is a great loss to the squadron, as he was so keen and was doing so well."

* * *

LEWIS.—Lt. Edmund Ll. Lewis, Essex Regt. and R.F.C., was killed by the fall of his machine over the German lines on Dec. 26th, after a single-handed fight with five enemy machines, in which he brought down one of them. He was the eldest son of Mr. Hugh Lewis, of St. David's, Templewood Avenue, Hampstead, London manager of the Liverpool and London and Globe Insurance Company, Limited, and was 21 years of age.

Educated at Marlborough and in Germany and France, he had returned home to take up a career at Lloyd's, when, on the declaration of war, he was appointed to a commission in the Essex Regt. In July, 1915, he left for the Dardanelles, but was invalided home in the following November. During his convalescence he learned to fly, and was seconded to the R.F.C. in March 1916. Within three months he was at the front, and after being engaged in many combats was wounded while fighting single-handed six enemy machines. On this occasion, with controls shot away, he managed to land safely on our side of the lines. After two months' sick leave he was again at the front. He was gazetted Lieutenant on the day after his death.

The O.C. his squadron writes:—"I should like to say how deeply I and the whole squadron mourn your son's loss. He was one of my stoutest-hearted officers."

* * *

PARKER.—Maj. Leonard Parker, Hussars and R.F.C. (now reported killed on Jan. 7th, previously reported missing), was born in February, 1886, the fifth son of the Rev. the Hon. Algernon R. Parker and Mrs. Parker, of Maesfen, Malpas, Cheshire.

Educated at Marlborough College and Christ Church, Oxford, he was captain of the Rugby Fifteen at Marlborough, and in the cricket eleven, and at Oxford he got his Rugby Blue in the 1905 team that just lost to Cambridge.

Maj. Parker took his Royal Aero Club certificate before the war, and, at its outbreak, joined the R.F.C., duly becoming Flight Commander and Captain, and later Major and Squadron Commander. He went out to France early in 1915, and remained for a year at the front, being slightly wounded in the summer of 1915. He returned to England in February, 1916, and went to France again in command of a squadron in the following November.

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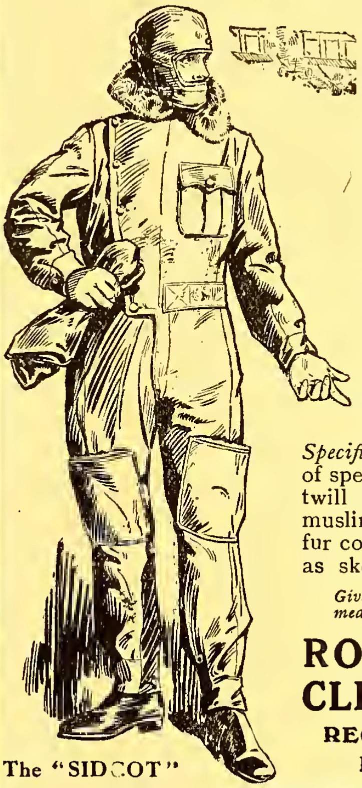
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Godbolds

On Sunday, Jan. 7th, he went out over the German lines to take photographs, and never returned. Subsequently, he was reported to have been attacked by two enemy aeroplanes, and his machine was seen to come down in German lines.

Reports from Berlin state that he was shot in the air and picked up dead near Peronne on Jan. 7th. This report has now been confirmed by a letter from his observer (now wounded and a prisoner in Germany), and accepted as official by the War Office.

* * *

PASHLEY.—Second Lieut. Eric Clowes Pashley, R.F.C. (S.R.), was killed in action in France on Saturday, March 17th. He was the son of Mr. and Mrs. A. H. D. Pashley, of 27, Badminton Road, London, S.W.12.

Those who remember the early days at Brooklands and Shoreham will deeply regret to learn of the death of one who, despite his youth, must be reckoned among the pioneers of British aviation. It must have been somewhere in 1910 when Eric and Cecil Pashley came to Brooklands and acquired a Humber monoplane which was a copy of a Blériot. Very few of us, I think, ever knew which was Eric and which was Cecil when they were together, and fewer still could distinguish them when apart. Both were equally keen and enthusiastic, both slaved early and late to make their machine fly, and both were equally merry and bright over their work.

They were quiet, hard-working lads, and rather kept apart from the noisily argumentative crowd of experimenters who made Brooklands the amusing place it was, but everyone liked them, and respected them for their determination. Their sole reward was that they persuaded that old Humber to do more real flying than anyone else had managed to get out of it. Later on they acquired an aged Sommer biplane, with a Gnome, and on it they did some astonishing flying, as flying went in those days.

When the Shoreham Aerodrome came definitely into being they migrated thither, and set up a school of their own, where they taught several people who turned out ultimately to be very useful pilots. Also they built a biplane of their own on the general lines of a Farman, and with it they became excellent, if somewhat rash, pilots. Be it said, however, that their rashness consisted chiefly in playing tricks in the air which to-day would appear harmless enough compared with the everyday aerobatics of Service pilots.

The Pashley School was just going nicely, and looked like becoming a success, when war broke out, and the R.F.C. took possession of the aerodrome and of all that was thereon, evicting the schools at short notice. Thereupon the brothers migrated northward, and eventually Cecil became senior instructor at the Grahame-White School, while Eric went to the Vickers School at Joyce Green. Both continued to do good work, and Eric became an exceedingly clever pilot of Vickers gun-machines.

Last year Eric was given a commission in the R.F.C., and soon turned out to be a first-class fighting pilot. During the comparatively short time that he was in the Corps he accounted for ten enemy machines, and on two occasions rescued one of our photographic machines from superior enemy attacks.

His C.O. has written to his parents a touching letter of condolence in which he said "your son has done exceptionally good work." All will join in sympathising with the late Mr. Pashley's family in their great loss, and will hope that their sorrow may be tempered by pride in his good work on active service.—C.G.G.

* * *

SMITH.—Lt. Allan Wenman Smith, The King's (Liverpool) Regt. and R.F.C., who was accidentally killed on March 18th, while flying in England, was the younger son of Mr. and Mrs. Frank Smith, "Fulford," Great Crosby, Liverpool. He was in his 21st year. He was interred at Sefton Church on March 22nd.

* * *

SMITH.—Sec. Lt. C. Smith, R.F.C., was killed in a flying accident at Lincoln on March 12th. At the inquest it was stated that Mr. Smith, after completing one circuit at 1,000 ft., switched off in order to descend, but apparently forgot to put on the right rudder. The machine spun to the left, the pilot regained control, but immediately went into another spin, and nose-dived to the ground. A verdict of accidental death was returned.

* * *

VERNON.—Sec. Lt. Leslie Gottfried Harcourt Vernon, M.C., Royal Welsh Fusiliers and R.F.C. (previously posted as missing, now reported killed), won the Military Cross last year "for conspicuous gallantry and skill.

"With Capt. Adams as pilot he attacked a flight of six enemy machines within their lines. They brought one down in flames, and, after being joined by a second British machine, drove off the remainder, one falling out of control. He has previously done fine work."

Mr. Vernon had his commission in the Royal Welsh Fusiliers in Dec., 1915, and was appointed an observer, R.F.C., in July, 1916.

* * *

WENDEN.—Capt. George Wenden, Border Regiment and R.F.C. (killed in action on March 16th), was eldest son of the late James Gordon Wenden, The Chantry, Dursley. He was 23 years of age, and had his commission in the Border Regiment in November, 1914. He received the rank of Captain in February, 1916, when he was appointed Flight Commander, R.F.C.

Marriages.

BURCH—ANDREWS.—On March 24th, at All Saints Church, St. John's Wood, Sec. Lt. R. S. Burch, R.F.C., was married to Miss Eugenie Andrews.

* * *

ECKERSLEY—GROVE.—On the 17th inst., at Holy Trinity Church, Sloane Street, Lieut. Peter Eckersley, R.F.C., youngest son of the late W. A. Eckersley and Mrs. Shawcross, Belsize Park, was married to Stella, younger daughter of J. C. Grove, 92, Sloane Street, and Watercroft, Penn.

* * *

FOSTER—FAIRFAX-BROWN.—On March 21st, at St. Paul's, Portman Square, by the Rev. Dr. J. Stuart Holden, Vicar, Lieut. Reginald Duncan Foster, R.G.A., attached R.F.C., youngest son of the Rev. A. Ernest Foster, was married to Ellen Hilda, only daughter of B. Fairfax-Brown, of The Mount, Baschurch, near Shrewsbury.

* * *

FULLER—LEGG.—On March 21st, at Jesmond Parish Church, by the Rev. G. D. Oakley, Edward Newman, Lieut.-Col. R.F.C., youngest son of George Fuller, of Chichester, was married to Dorothy Kate, eldest daughter of Mr. and Mrs. James Legg, of Paul's Dean, Salisbury.

* * *

MILLAR—MUNDAY.—On March 19th, at St. Augustine's, S. Croydon, Sec. Lieut. Max A. Millar, R.F.C., was married to Mary Cissie, daughter of C. F. Munday, Admiralty.

Births.

GAME.—On March 23rd, at Seaton Burn House, Northumberland, the wife of Felix J. Game, R.F.C., of a daughter.

* * *

KAYE.—On March 24th, at Kerwood, Bradford, the wife of Capt. H. Gordon Kaye, R.F.C., of a son.

* * *

KINGSLEY.—On March 16th, at 61, High Street, Hampstead, Lois, wife of Shirley G. Kingsley, R.F.C., of a son.

* * *

O'MALLEY.—On Friday, March 23rd, 1917, at 11, Park Square, N.W.1, the wife of Major Harold O'Malley, R.F.C., of a son.

Too late for reference last week there appeared in the "Gazette" the promotion to Brigadier-General of Brevet Major, and temporary Lieut.-Col., G. S. Shephard, M.C., Royal Fusiliers. General Shephard will be remembered by the earlier hands in aviation as a pupil at Brooklands. He was one of the first officers to join the R.F.C., and did much good work in the early days of the Corps at Farnborough and Netheravon. Before taking to flying he had already distinguished himself by special service of high military value, and his subsequent career as a pilot and as an officer marked him as certain of early promotion to greater responsibilities. He won the Military Cross early in the war, and later earned special promotion to Major by brevet, being then graded Wing Commander with temporary rank as Lieut.-Colonel. The personal regard in which he was held by all who have served with him is equalled by the respect which his military qualities have won for him, and his present promotion would appear to be merely another step in a career destined for higher distinction.

FRANCE.

Official Communiqués.

March 20th.—One of the German aeroplanes which was reported as destroyed on March 17th was brought down by Adjudant Douchy. This is the fifth machine brought down by this pilot.

Yesterday two German machines were brought down in our lines in the course of air fights—one in the region of Noyon and the other in the direction of Guiscard.

A German machine which was attacked with a machine-gun by one of our pilots on March 16th was discovered yesterday by our troops near Noyon. It is also confirmed that on the same day (March 16th) our anti-aircraft guns brought down a German aeroplane in the region of Manheulles (south-east of Verdun).

This afternoon our aviators reported that the historic ruins of Coucy le Château had been destroyed by an explosion.

March 21st.—The Army of the Orient.—Two German aircraft were yesterday forced to alight on the Doiran front by a British aviator, one of them falling between the lines.

March 23rd.—Yesterday an Albatros chaser was brought down in our lines in the region of Vézelise (south-west of Nancy).

To-day a German aeroplane was brought down by our anti-aircraft guns. The machine fell in our lines near Dieulouard.

March 24th.—On the 23rd Adjudant Ortoli brought down his fifth German aeroplane.

To-day our anti-aircraft guns brought down an enemy machine, which fell in our lines near La Veuve (north-west of Chalons).

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This afternoon a German seaplane, going towards Etretat (on the coast, north of Havre), was captured at sea. The two aviators were taken prisoner.

On March 23rd one of our aeroplanes bombarded at a low range the aerodrome of Marimbois, to the north of Thiaucourt. A violent fire broke out in the sheds, which collapsed.

During the night March 22nd-23rd and the following night our squadrons dropped 1,100 kilogrammes (over one ton) of projectiles on the factories of Thionville and the Briey Basin, as well as on the station of Conflans (respectively north, north-west, and west of Metz).

Army of the Orient.—British seaplanes bombarded Pradista and Kenali, in the Gulf of Orfano.

March 25th.—During the 24th Adjudant Ortoli brought down his sixth German aeroplane.

Another enemy machine was brought down in the region of Fontaines Wood.

German aeroplanes dropped several bombs last evening on Calais and Dunkirk. At Dunkirk there were no victims, and no damage was done. At Calais two civilians were killed and one injured.

March 26th.—Yesterday five German machines were brought down by our pilots. Adjudant Ortoli brought down two, bringing to eight the number of enemy aeroplanes destroyed by this pilot.

Last night one of our air squadrons dropped 1,000 kilogrammes (about one ton) of bombs on the factories of Thionville and the Briey basin and on the railway station of Conflans and Montmédy (in the Metz and Verdun regions).

* * *

It was reported from Paris on March 26th that sweets containing poison and infectious germs are again being dropped by German aviators a considerable distance inside the French lines.

The Prefects of Besançon and Bar-le-Duc have issued notices to parents advising them to warn their children not to eat any sweets they may find.

GERMANY.

Official Communiqués.

March 20th.—In air fights 13 enemy aeroplanes were brought down, and our anti-aircraft fire shot down two more.

March 21st.—In the Tcherna bend our artillery fire brought down a captive balloon in flames.

March 22nd.—Three enemy aeroplanes were shot down.

The aeroplane piloted by Prince Friedrich Karl of Prussia, which went for a flight over the enemy lines between Arras and Péronne, has not returned.

March 25th.—Between the sea and the Moselle our aeroplanes made numerous attacks against enemy machines and objectives on the ground. During aerial engagements the British and French lost 17 machines.

Oberlieutenant Baron von Richthofen brought down his 30th opponent, and Lieut. Voss his 16th and 17th.

March 26th.—On the Macedonian front, bombs dropped by our aviators on enemy camps near Snevce, to the south-east of Lake Doiran, had very good effects.

Western Front.—In the evening of March 24th an air squadron attacked Dunkirk. Several fires were observed.

Yesterday the enemy lost 11 machines in aerial combats.

* * *

A telegram from Berlin on March 22nd stated that Prince Friedrich Karl of Prussia was apparently wounded and a prisoner. On March 21st he took part in a reconnaissance flight.

It was reported on March 26th that Prince Friedrich Karl had died of wounds since his capture.

Prince Frederick Charles was a great grand-nephew of Kaiser William I, and a second cousin of the present German Emperor. His great grandfather, Prince Charles, was a brother of Wilhelm I. The Royal aviator was the second son of Prince Frederick Leopold, and was born in 1891. In April, 1916, he married Princess Marie of Schaumberg-Lippe.

The young Prince, who was a nephew of the late Duchess of Connaught, was a particularly able lawn tennis player, gaining a reputation in this country as such. He entered the lawn tennis championship matches at Wimbledon some years ago under the modest *nom de jeu* of "F. Karl," and it was some time before his identity was revealed, although the rumour quickly got about that he was a German Prince. He enjoyed great popularity at Wimbledon, Queen's Club, and other centres of the game visited by him.

RUSSIA.

Official Communiqués.

March 22nd.—Roumanian Front.—In the direction of Focsani the enemy is displaying intense aerial and artillery activity.

March 23rd.—Roumanian Front.—In the direction of Focsani the enemy is displaying lively artillery and aerial activity. German aeroplanes have dropped bombs on Galatz.

March 24th.—South-west of Dvinsk one of our machines attacked an enemy aeroplane. After machine-gun fire on both sides the two machines landed rapidly within the enemy's lines east of Novo Alexandrovsk.

ITALY.

Official Communiqués.

March 20th.—Numerous air encounters took place. We brought down an enemy aeroplane on the Asiago Plateau, the aviators being taken prisoners.

March 21st.—An enemy aeroplane was brought down in flames by our fire in the vicinity of Lokvica; the aviators were killed.

ROUMANIA.

Official Communiqué.

March 22nd.—Reconnoitring enemy aviators dropped a number of bombs upon our munitions depots.

HOLLAND.

It was reported from The Hague on March 22nd that a telegram from Berlin states that another of the best German military aviators, Fritz Mannschott, has been killed in an aerial combat on the Western front.

GREECE.

Mr. G. Ward Price, wiring from Salonika on March 19th, states that three German aeroplanes have been brought down in two days on the Dorian front by Capt. Murlis Green, R.F.C., who has already accounted for 4 enemy machines single-handed, and another one in which he shared the honours with another aviator.

For these and other duties effectively accomplished Capt. Green received on the 19th the D.S.O. and the Serbian Order of the White Eagle, which is given only for military deeds of exceptional brilliance. These are in addition to the French Croix de Guerre and to the Military Cross with a bar which he already held.

A REGRETTABLE ACCIDENT.

On March 26th Mr. J. B. Fitzsimmons was killed at Hendon while flying an experimental scout biplane built by the Nestler Co. The cause of the accident is not at present known. Mr. Fitzsimmons, who was trained to fly at the Ruffy-Baumann school at Hendon, was on active service for over a year and took up test flying after being invalided. He was an exceptionally fine pilot and rather given to spectacular flying, but it is not apparent whether his handling of the machine was contributary to the accident or not.

A NEW SYSTEM OF INSTRUCTION.

In every sphere of education it has been found that "Class Instruction" has undoubted advantages over individual instruction, and thus one sees instruction by classes being carried out in all walks of life, whether at the Elementary School, the Secondary School, the Private School, the Public School, the Technical School, or the University. The abject waster is quite frequently the "crammer's pup," or the product of the private tutor.

The pre-war flying school, though it contained pupils in numbers, was apt to give too much individual instruction, or not enough, in some cases In any case, there has never been any guarantee that because a man was trained at a certain school he had therefore reached a certain standard of proficiency.

To put it in another way, one knows what to expect when a man has taken his B.A. at Oxford, or Cambridge, or Trinity College, Dublin, or at Edinburgh, and what not to expect from the minor universities, but except as regards those fortunates who passed through the Central Flying School of the pre-war, and early war, days there has never been a definite criterion of aeronautical skill and knowledge.

This idea underlies a scheme which has now materialised into the Oval School of Flying. Briefly, the proprietors' scheme is as follows:—

(1) Class instruction in groups.

(2) The term of instruction to run over a minimum of two months, with the option, if a pupil desires it, to go through a second course of two months free of charge.

(3) All pupils to be under the control of the principal of the School during the whole time of their tuition. This is to guard against the possible effect on the nervous flying temperament of irregular hours and all that is implied thereby.

(4) Accommodation for all pupils in an old and comfortable mansion attached to the flying ground.

(5) To secure that the class idea shall be adopted at the very beginning of the career of the pupils at what, it is hoped, will become a regular Flying College.

This new idea in aviation instruction is, one understands, about to be put before the public. It embodies the essential characteristics of the very earliest forms of tuition (when the Egyptians taught the Israelites to make bricks they adopted one of the principles on which the school intends to act), together with those psychological processes on which modern educational experience places reliance in the development of the proper state of mind to acquire facts as much as on the acquisition of facts themselves.

The scheme seems distinctly interesting, and it is backed by business men whose record gives one confidence in their ability to "make" good on anything which they may undertake, so intending aviators will find it worth while to investigate further.

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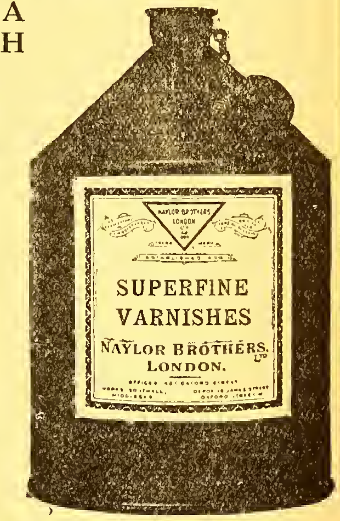

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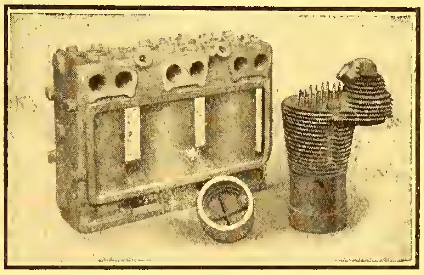

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ANSWERS TO CORRESPONDENTS.

On account of the labour involved in replying to questions from correspondents, many of which in the past have been answered over and over again by post, it has been decided to answer inquiries of general interest in the columns of The Aeroplane. *Inquiries should be addressed to The Editor, 166, Piccadilly, W.*

Readers by the Hundred.—If you want any information about joining the R.F.C., write to the Director of Military Aeronautics, Adastral House, Blackfriars, E.C.

If you want any information about joining the R.N.A.S., write to the Air Department, The Admiralty, Whitehall, S.W.

Men in the Army, and ratings in the Navy can only obtain commissions in their own branches or transfers to other branches by permission of their immediate commanding officers, who must forward those applications through the proper official channels.

Civilian applicants for commissions in the R.F.C enter through the Cadet Wings, and are trained to fly at the Government's expense.

Applicants for commissions in the R.N.A.S. enter as Probationary Flight Officers, and are trained at Government expense.

If you are blind or partially blind, or have to wear glasses for any serious reason, you cannot become a Naval or Military aviator.

If you have had special technical training, are over 35 years of age, and attain the necessary social standard, which is not high, you may with luck become a Stores Officer R.N.A.S., or an Equipment Officer R.F.C., even if your sight is defective and you are physically deficient in other respects.

Information concerning appointments as viewers or examiners or inspectors in the Aeronautical Inspections Department may be obtained from the Chief Inspector, A.I.D., Adastral House. Blackfriars, E.C.

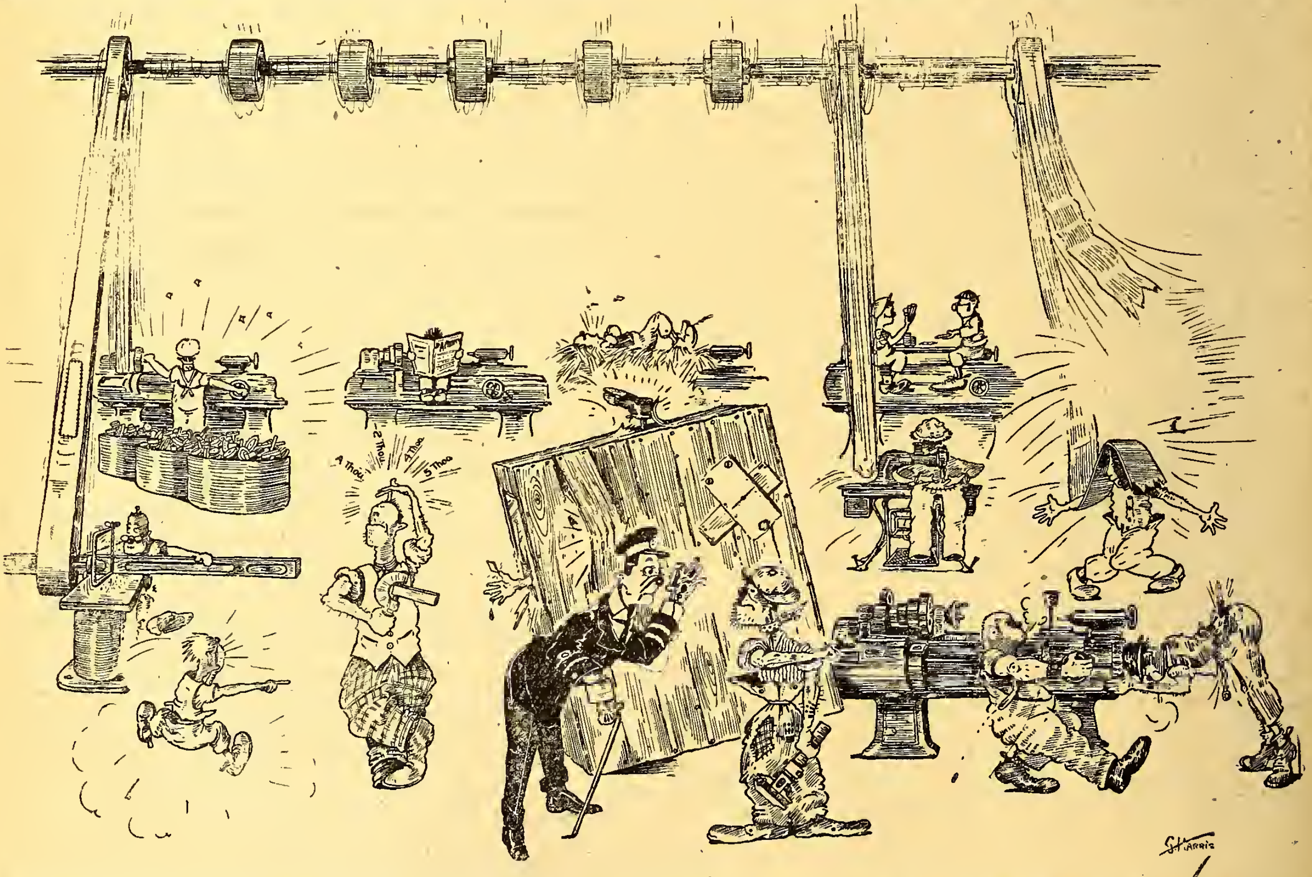
Observation of the points indicated above will save a great deal of unnecessary correspondence at the Admiralty, at Adastral House, and at this office. as there is no need to write letters on any point already explained above. The Editor is always pleased to answer questions or explain any points not understood by readers, but space in The Aeroplane is valuable, and the same question cannot be answered over and over again week after week. Consequently readers are requested to make quite sure that their questions have not been answered a week or so before.

K. W. R. (Chelsea).—It is quite hopeless for anyone with the slightest defect in vision to apply for an appointment as a naval or military aviator. The fact that you do not wear glasses does not assist things in the least, as if you took proper care of your eyes you would have to wear glasses. Most short-sighted people can drive cars and motor-cycles quite successfully because the only things they need to see are the road and the people on it, but an aviator is expected to be able to see a small object like a machine-gun from an altitude of several thousand feet, which is not exactly the same thing. Also, unfortunately, people with short sight have a nasty habit of attempting to land aeroplanes twenty feet below the surface of the ground, which is bad for the aeroplane and for themselves.

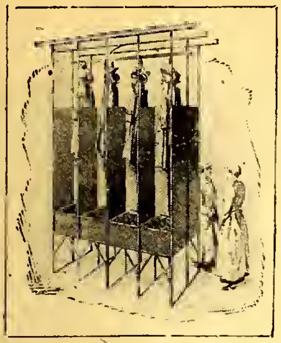
G. A. B.—Before you apply for an appointment to either of the Flying Services you had better make perfectly sure whether you want to go into the Navy or the Army, or whether you wish to become a kind of hermaphrodite. What you don't seem to understand is that the rank of Sub-Lieutenant is naval, and that the Royal Flying Corps is a military institution. A Cadet in the R.F.C. remains a Cadet until he is appointed as a Flying Officer with pay and allowances to fit. The training at the elementary cadet school is only a beginning to a Flying Officer's education, and the Government is naturally not anxious to pay a man £1 a day during the period when he is being taught elementary geography and how to wear a Sam Brown belt.

C. F. W. G. (Southsea).—Apparently the only two French aeronautical journals in existence are "L'Aérophile," 35, Rue Francois 1er, Paris—subscription rates for a year 18 fr.; and "La Guerre Aerienne," 30, Rue de Provence, Paris—subscription rate for one year 29 fr., and for six months 15 fr. These apparently are not kept in stock in this country.

The age limit for taking Royal Aero Club certificates is 17.



SCENES IN AN AIRCRAFT FACTORY.—XI.—THE MACHINE SHOP.—In the centre foreground an astonished and indignant Official engages in argument with a millwright, complete with monkey-wrench as fitted, and, judging by the set of the workman's jaw and the direction of his wounded finger, the latter does not seem properly impressed by the enormity of his offence. On the right, two industrious machine-hands endeavour to shift a jambed back-centre. Behind the Official Personage, a workman becomes involved with a packing-case, and appeals for help to a fellow-worker, who, pre-occupied by the intricacies of micrometer measurements, disregards both the appeals of the gory hand and the vociferations of the frantic shop-boy. To the left, an earnest, if misguided, hand, amputates a perfectly good main spar with a jig-saw, and behind him the star-turn machinist, duly indicated as such, produces buckets-full of fittings with skill and rapidity. To his right, another machinist is distracted from his work by a pernicious print popular among aeroplane producers. To his right, again, another worker, waiting for raw material, takes a possibly well-earned rest, and still further to the right, an unduly clever hand lures another to his undoing. Below them, a sewing-hand does a domestic job of work for a male friend, and to her left an assistant millwright makes a bad job of fitting a new belt, with dire consequences.



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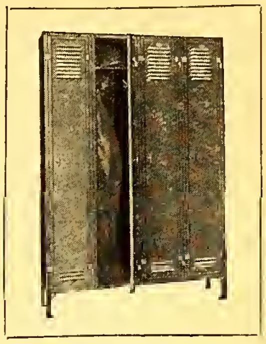

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F. H. T. (Northampton).—There does not seem to be any regulation time which is officially supposed to elapse between the attestation of an Air Mechanic for the R.N.A.S. and the date on which he is called up for service. The casualties among Air Mechanics, R.N.A.S., are few, and the Service does not expand as rapidly as does the R.F.C.; consequently the reserve of mechanics procured by attestation is less drawn upon than in other Services. Anyhow, you will probably get a week's notice or so before being called upon to join up.

A. J. (Wolverhampton).—The Aeroplane of Feb. 28th answers your question. If you read the article about Mr. T. O. M. Sopwith you will see that one of his machines with a Green engine won the Mortimer Singer prize for making successive flights off land and water, the machine being a flying-boat fitted with wheels. The Caudron Co. also made a number of amphibious machines, as did the Voisin Freres.

The 320 h.p. Sterling-Sunbeam engine is the most powerful aero-motor of those of which it is permissible to write, that engine having been described in an American paper. As a matter of fact there are aeronautical motors in existence up to 600 h.p. –

G. A. M. (Clapham Common).—If a candidate for appointment to an R.F.C. Cadet Wing applies before he is 18, he is practically bound to receive a decisive answer before he is actually called up for ordinary military service, for these matters take a fairly short time to settle in these days. The reference to men who are fit for general service applying for the R.F.C. refers, of course, to A/Ms. only, because young and fit men who are otherwise suitable for appointment to a Cadet Wing are precisely the type required as pilots.

H. R. G. C. (York).—Commissioned or non-commissioned ranks in the R.F.C. follow precisely the same order of precedence as they do in any other branch of the Army, but there are certain gradings which are not actually ranks which are peculiar to the Flying Corps.

An officer graded as Brigade Commander has the rank of Brigadier-General; Group Commander, Colonel; Wing Commander, Lieut.-Colonel; Squadron Commander, Major; Flight Commander, Captain; Flying Officer, Lieutenant or Second Lieutenant, according to his seniority in the Army.

Depot Commanders are Lieut.-Colonels, Parke Commanders are Majors, Equipment Officers 1st Class are Captains, Equipment Officers 2nd Class are Lieutenants, and Equipment Officers 3rd Class are Second Lieutenants.

The non-commissioned ranks are Sergeant-Majors, who are warrant officers, and then follow sergeants and corporals, who are N.C.Os., and then 1st, 2nd and 3rd Class air mechanics.

T. K. (Romsey).—Most modern aeroplanes—our own, the French, and the German—are fitted with gear which permits of a machine-gun being fired so that bullets pass between the propeller blades without touching them.

Earlier in the war it was the custom to fire a machine-gun straight through the propeller and chance whether the bullets hit the propeller or not. It was found that when the gun was fired only about 4 per cent. of the bullets hit the blades and that three or four holes in a blade do not materially affect it. In consequence of this the propellers had to be changed after every flight in which the gun was used, and naturally it became rather expensive in propellers. The synchronising gear was evolved as the result.

C. L. D. (Woking).—Being now 17 years of age the chances are that you will be called up for Military Service before you have time to acquire more than a superficial knowledge of aeroplane construction, so that perhaps your best way of learning something about aeroplanes would be to learn to fly before you reach military age—that is, of course, if you can afford the necessary fee. If you obtain your certificate in this way, it would probably influence considerably an application for a commission in the Royal Flying Corps. It is also possible that if you put in a year in an aircraft factory the technical knowledge thus gained might also assist you into the R.N.A.S., or R.F.C. In the latter case, your best plan would be to approach various aircraft firms in your neighbourhood and see whether they will take you on either as a general helper in the shops or as a temporary apprentice for the period of a year.

W. R. C. (Norfolk).—Unfortunately, owing to the existence of the war and the necessity for the preservation of military secrets, it is quite impossible for me to give you dimensions of the de Havilland biplanes or any other machines of military value.

W. le M. (Longside).—The thrust given by a 100 h.p. propeller might be anything at all, according to whether static thrust or high speed were required. The fuel consumption of a reasonably economical 100 h.p. engine is in the region of 8 gallons per hour.

D. N. D. (Cheltenham).—The probability is that any youngster passed by any Military Medical Board for Cadetship for Woolwich or Sandhurst would equally pass for the R.F.C., provided that his sight was really good.

A. G. G. (Ramsgate).—Your various questions can best be answered by the R.N.A.S. Recruiting Depot. So far as one knows you are quite eligible for enlistment in the R.N.A.S. if you join up before you are called to the Colours under the Derby Scheme. You should read the first paragraph in the Answers to Correspondents in the current issue.

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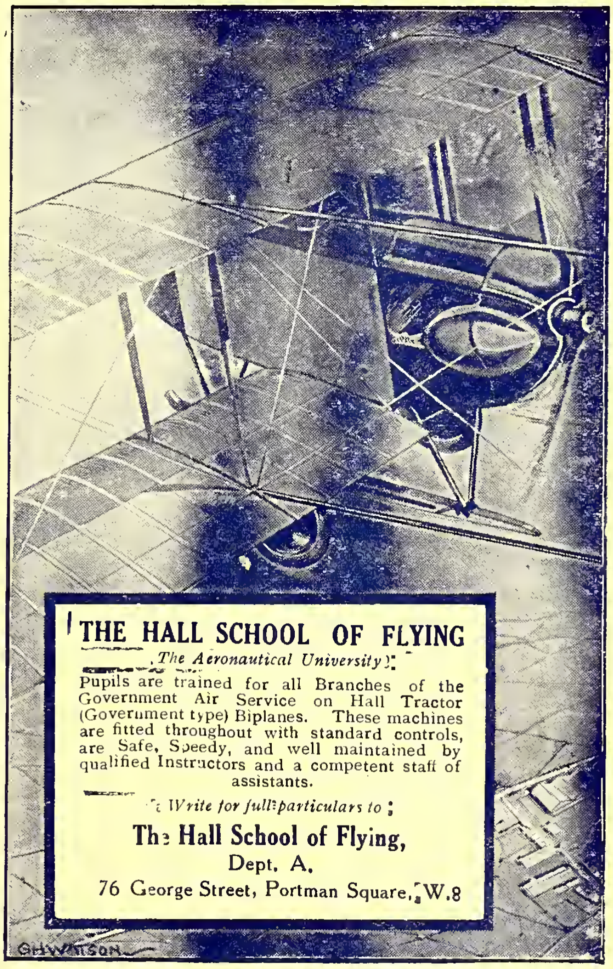

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